

# MODERN Machine Shop

HOWARD CAMPBELL, Editor

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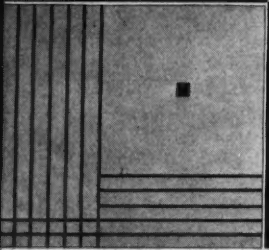
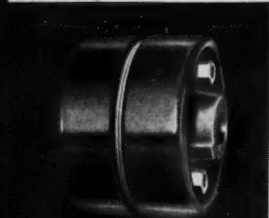
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# MODERN Machine Shop

15  
chapter 7

CINCINNATI, OHIO

MAY, 1934

VOL. 6, No. 12

## Die Casting: An Asset to the Metal-Working Shop

BY F. L. MOREHEAD  
Consulting Engineer

for p 18-6.

**M**ANUFACTURERS of metal products too often consider die castings as unsuited to their own uses without troubling to learn whether they can be employed to advantage or not. There are several reasons for this, perhaps the most important one being the mistaken idea that die costs are so high that the process is not feasible for any but very large-production items. Another so-called reason is that the metals available are too weak or too soft for all but very restricted applications. A third is that stampings or sand castings are cheaper and more satisfactory for a variety of reasons.

Since these suppositions are not well founded in some cases and in others are wholly erroneous, they often result in a more costly and perhaps a less satisfactory product than would be secured if die castings were employed. It is thus well worth while learning when die castings can be used with marked economy

and satisfaction. With this in view, some general observations may be made and some specific instances cited in which the savings realized are unquestioned.

Take first the question of die costs. These, of course, vary greatly. They depend upon the size and complexity of the piece, upon the kind of metal to be used in the die casting, and upon other factors. Some simple dies for

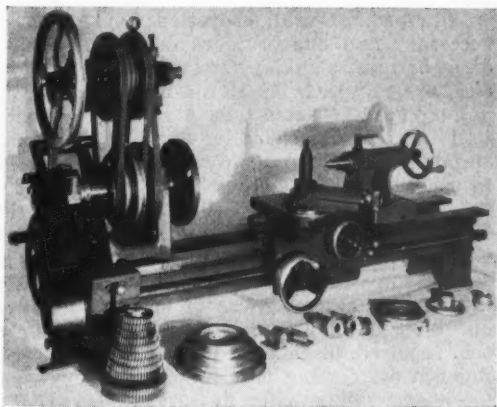


Fig. 1—Gears, pulleys and many other parts of the Atlas lathe are die cast from zinc alloys. These parts cost less than finished iron sand castings and are stronger.

small parts can be made, however, for as little as \$50, and a large proportion of all dies cost less than \$500. Frequently the cost of die-casting dies is considerably less than that for stamping dies for an equivalent piece. This is likely to be true, in fact, when the piece is of medium size and of such shape that, if stamped, drawing operations or assembly operations are required. In such cases, if the piece



Fig. 2—Much automobile and other hardware is die cast from zinc alloys. It is easily plated. Carefully-made castings of this type require no grinding or polishing (buffing only) before plating.

is stamped, several operations are necessary and one or more drawing dies, besides blanking and piercing dies, are required. Each die also requires separate set up, as a rule, as well as several handlings of the stamping. Die upkeep is also likely to exceed that for die castings.

The die casting is produced in a single die which may have one or several cavities, as required. Very often several different pieces, perhaps forming a single assembly, can be made in one die-casting die. The only other tool required, in general, to produce a finished die casting is a simple shaving die for trimming off fins. Even this can often be dispensed with in favor of hand cleaning with a file, especially when the number of die castings required is not large. Very often the

die casting is made in one piece whereas the equivalent stamped part must have more than one piece and involve assembly operations.

Naturally, there are also many cases in which stampings are cheaper and perhaps better for other reasons than the die casting, though the reverse is often true also. Stamping presses run much faster than die-casting machines and so have a higher production rate. When this is the controlling factor the stamping is a likely choice but each factor must be weighed in each case to arrive at the best and least costly result. It is true also that die castings are frequently combined with stampings to good advantage.

No definite rule can be set to determine when it will pay to make a die-casting die. In many instances it pays only when a few hundred parts are needed; more often it pays only where several thousand parts are needed, especially if the quantity runs to 5,000 or more pieces.

On the score of strength and suitability of metals available, there is much to be said. Die castings seldom equal wrought metal parts in strength section for section, but they can be made equally strong by using heavier sections than for the wrought parts. On a basis of equal strength, casting will be stiffer than the wrought metal.

What is usually more important, however, is that the die casting is likely to be stronger and lighter and especially of better finish than a corresponding sand casting, and in addition is likely to cost less in finished form than a finished sand casting, the cost included, if the quantity required is not small. Zinc-base die castings of proper alloy are stronger than gray

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iron castings and than most non-ferrous sand castings, and the same is true of aluminum-base die castings, though the latter are not quite so strong as the zinc type of the same section thickness.

Lead and tin die castings are not strong but are relatively little used,

reasons of appearance, as in automotive and other hardware, for example.

An important factor in favor of die castings, of course, is that they are produced rapidly and accurately in exact duplication. It is not only possible to die cast very thin sections, but to hold much greater accuracy in

dimensions than with sand castings. Certain dimensions can also be held within much closer limits than with similar stamped parts. It is possible for a drawn stamping to go out of shape or show draw marks when buffed for plating, but this is not true of the die casting.

If cast properly in a die that is correctly designed and finished, little or no grinding or

polishing is required, except perhaps where fins are removed. A mere buffing is sufficient to prepare the surface for plating.

Although many die castings are

and never where high strength is a controlling factor. Brass die castings are excellent for some purposes and are the strongest of all castings made in die-cast form, but they are also high in cost and have other limitations. Some brass alloys are almost as strong as mild wrought steel.

Although most die-cast alloys are softer than wrought steel and than some other wrought and cast metals, they are plenty hard enough for a very wide range of applications and are rarely barred from use on the score of softness. The zinc alloys in some cases have proved to be more wear resistant than gray iron castings, as in lathe gears, for example.

Most die-casting alloys are quite resistant to corrosion and, of course, none of them rust. The lead, tin and aluminum alloys take a good polish and hold it well enough for use without plating in some applications. Most alloys can also be plated and the zinc-base type is very often plated for

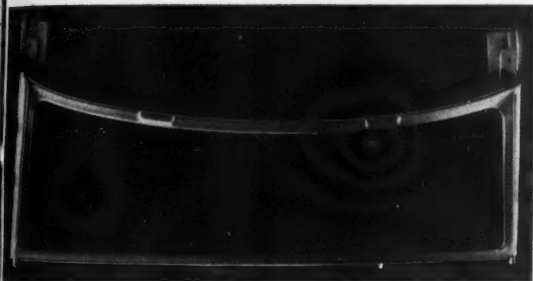


Fig. 3—Windshield frame die cast in one piece from zinc-base alloy. If sand-cast, much more finishing would be required; hence a die, even for so large a part and required in lots of only 400 a year, was amply justified by the savings realized.

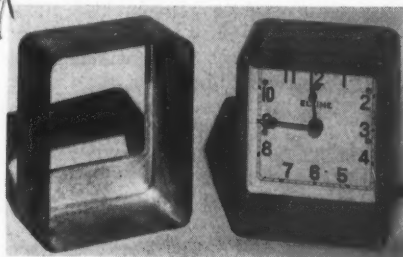


Fig. 4—Eltime clock case only 0.035 in. thick die cast from Zamak alloy. It proved cheaper and more satisfactory than a stamped case and required less die investment.

plated or enameled for appearance sake, they are often used without any finish and are quite satisfactory either with or without finish in a host of ap-

plications. Because of the clean surface secured and the accurate dimensions that can be obtained, very little if any machining is required on an average piece. This is an important reason why, despite die cost, die castings often displace sand castings. The latter may cost less per rough casting than a die casting but, because the sand casting has to be machined where the die casting need not be, the finished cost of the latter is higher.

This fact is well illustrated in the



Fig. 5—Die-cast aluminum spouts with integral rivets to afford a secure fastening. The stamped spout, also shown, was clinched in place and usually leaked if struck a blow.

case of automobile windshield frames and stanchions that require plating. Sand castings cost less, at least for small quantities, but when they must be ground all over to secure the desired finish, the extra labor soon increases costs to a point where the cost of dies for die castings is much more than offset. This proved true even in the case of one windshield frame required in lots of only 400 per year, although the die, one of the largest ever made, represented a very large investment.

A good example of the economy of die castings is the Eltime clock case, which happened to be the first piece of its size to be cast from zinc alloy in a thickness averaging only 0.035 in. Stamping required several dies and

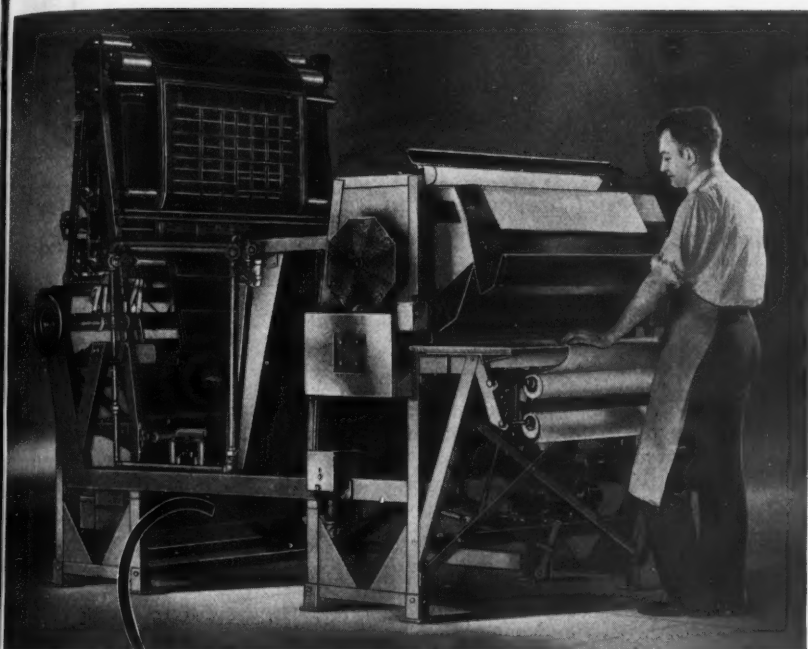
involved a fairly deep draw. When buffed, the stamping went out of shape and showed a rippled surface which was unsightly. This was because the buffing relieved the stresses set up in the metal by the drawing operation. In addition, the opening stamped out for the face of the clock resulted in a considerable scrap loss.

When made from a die casting, only one relatively inexpensive die was needed. The castings were readily held to the required size, and were so smooth that a simple buffing made the casting ready for enameling. It did not warp out of shape and no ripples were produced by buffing. Moreover, scrap loss was substantially nil.

Another case in point involved the substitution of a die-cast for a stamped aluminum spout for a coffee percolator of the low-cost type. The percolator body was drawn or spun from sheet aluminum and had a stamped spout attached by the clinching method. This spout, if struck, was quite easily loosened, resulting in a leak. By die casting the spout it could be provided with integral rivets, that is, rivets cast in place in the die casting. These rivets could all be clinched in a single operation, which resulted in a tight and permanent joint. Cost figures are not available but, although the simple stamped spout may have been cheaper, it was not satisfactory. Of course, integral rivets are not possible on a stamped part, but they are added at trifling expense and with considerable saving and convenience in a die casting.

From the foregoing it should not be concluded that the merits of stampings are not appreciated or should not be considered in designing and estimating on new products, for quite the reverse is true. Both stampings and die castings find many applications in which they are supreme and in which neither can logically be replaced by

(Continued on page 28)



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# What of the Finish?

BY JOHN H. MARCHMONT  
Staff Correspondent

*Does your product present a good appearance when ready for the market, and will it retain its good looks indefinitely? This article contains some suggestions that may be good for your business.*

**T**ODAY, more than ever before, manufacturers are recognizing the fact that the importance of finish is secondary only to mechanical perfection. In fact, in many instances the quality of the finish on a product has more effect on the making of a sale than the mechanical efficiency. This statement applies particularly to automobiles, which are often purchased upon the recommendations of the feminine members of the family. It is not quite so applicable in the case of mechanical products such as production machinery, but there is no doubt that, mechanical efficiency and other factors being anywhere nearly equal, the finish is the deciding factor in the making of the sale.

Aside from the sales factor, the condition in which the surface of a metal product is left when it leaves the manufacturers' hands has a very large bearing upon the life and mechanical efficiency of the unit. It has only been within the last 20 years the manufacturers have really begun to realize the amount of waste, in dollars and cents, that is caused by rust and corrosion. Various kinds of methods have been tried in an effort to curb the activities of these thieves, but mostly without success.

Some eighteen years ago, however, a company was formed in Detroit in

which the combined knowledge and efforts of chemists and engineers were concentrated on the solving of the problems arising from the depredations of rust and other forms of deterioration. This company — the Parker Rust-Proof Company — may not be the only company that has developed a method of successfully combating these enemies of metal in its various forms, but the use of its methods has spread until today the trained experience of the Parker organization is an integral part of the production methods of hundreds of industrial plants, and the finishing needs of thousands of other manufacturers are cared for by allied service plants located in 23 industrial centers of the United States.

The Parker Processes—Parkerizing and Bonderizing—will be discussed here as outstanding examples of the advance that has been made in recent years in the development of deterioration-resistant finishes. A number of examples will be cited by means of which the reader may be able to judge the applicability of the processes to his own products.

Ordinary iron and steel are the least permanent of metals. Iron ore closely resembles common rust; in fact, there is very little chemical difference between the two. Thus "rust-

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proofing" consists in checking the tendency of the metals to return to their original state.

Metal surfaces that require no finish for appearance's sake are too frequently left as they come from the machines or assembly department—clean but bare of paint, enamel, or other finish. Unless such parts are "working parts"; that is, parts that will be kept clean of rust by reason of other contacting surfaces or the abrasion due to service, it is inevitable that rust will appear and, if not checked, will take its toll.

equally adaptable to the needs of the small or the large manufacturer. The process consists of three steps; cleaning, processing, and finishing. The first of the three steps can hardly be considered a part of the Parkerizing process, due to the fact that the parts would in most cases be cleaned anyway. The usual method of cleaning

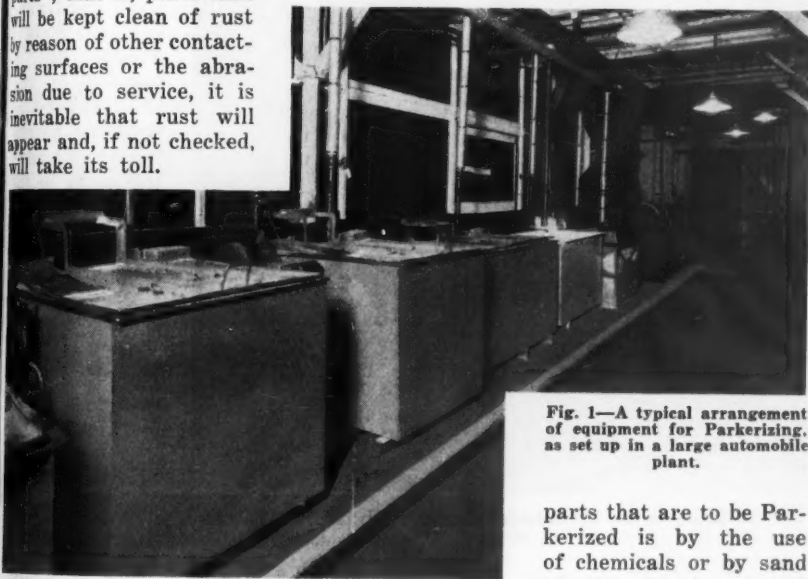


Fig. 1—A typical arrangement of equipment for Parkerizing, as set up in a large automobile plant.

parts that are to be Parkerized is by the use of chemicals or by sand blasting. In the case of

Metal parts can be immunized against the ravages of rust, and by the use of a comparatively simple process called, by reason of its origin, "Parkerizing." The Parkerizing process chemically converts the easily rusting surface of the metal to a surface that is highly resistant to rust. Briefly stated, the chemical used in the process changes the character of the original surface to phosphates which are practically insoluble in water and impervious to air.

There is nothing complicated or involved in the commercial application of the Parkerizing process, and it is

parts that are made from cold rolled stock or have machined surfaces, such parts can be processed satisfactorily merely by removing the oil or grease. In a large percentage of cases, no cleaning whatever is necessary.

The processing is done in a steel tank with a solution composed of "Parco" powder and water, heated to a temperature of 210 degrees F. When the iron or steel parts are immersed, a vigorous chemical action takes place which gradually abates until it has ceased entirely. At this point the articles are removed, ready for the final finishing.

The finish used depends upon the use that is to be made of the product. If the material in process consists, for instance, of bolts to be used in the assembling of heavy machinery, it will be obvious that appearance is a minor factor. In this case the final finish consists of an application of

A complete Parkerizing unit may consist of a processing tank, alkaline wash tank, rinse tank, pickle tank, suitable containers, portable drain rack, and one or more tanks for finishing, although in many cases a considerable part of this equipment may not be required.

The work can be handled efficiently with ordinary tanks. Small pieces can be handled in bulk in baskets or tumbling barrels, while larger pieces can be suspended from racks. It is only necessary that the parts be completely immersed in the solution.

All units of the installation are generally placed in line, so that one track and hoisting apparatus can be used to serve all tanks, as shown in the

illustration Fig. 1. This installation is in use in one of the large automobile plants in Michigan, and consists of a series of tanks in straight line for cleaning, processing, and finishing. After cleaning, the material is placed in revolving drums which are immersed in the solution and slowly revolved by motor drive until the processing action is completed. The large pieces, such as brace rods and similar parts, are processed in baskets placed in the still process tanks.

The parts are then finished by dipping in a black aniline dye and following with an application of lin-

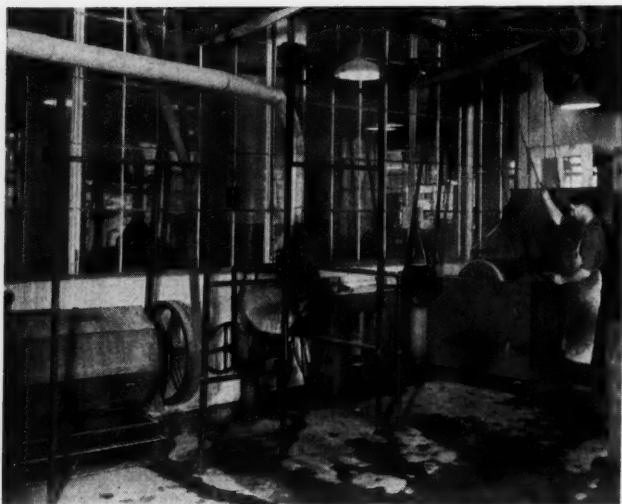


Fig. 2—Corner of the Parkerizing department in The Barber-Colman plant, Rockford, Ill.

mineral oil or linseed oil. The oil is applied either by spraying or dipping the parts, after which the parts are allowed to drain or are revolved in a centrifugal machine to remove the surplus oil.

If neatness of finish is a factor, although no color is to be used, the parts are dipped in a stain which gives the parts a pleasing matte black finish. This finish is used on typewriter parts, adding machine parts, and similar parts for the mechanisms of mechanical units for use in the business or domestic world. Such parts are also oiled after staining.



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**grips your pulleys  
25% to 40% better  
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Now you can get this extra gripping power in belting—where more grip means more speed, and more speed means more production.

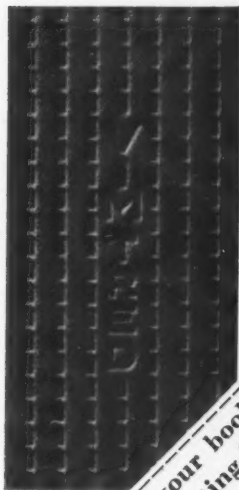
VIM TRED Leather Belting will not only increase the productive speed of your machines, but will give you many other advantages which no other belt can offer—

1. It is so flexible that it hugs the pulleys at any speed. This is particularly advantageous on short-center drives.
2. It runs smoother and without vibration because it is pressed to absolutely uniform thickness throughout its length.
3. Dust cannot settle on the belt or pulley because as the belt contacts the pulley, the air is forced out the narrow grooves in tiny jets which blow dust away.
4. It can be run under lower tension which means less wear on belt, pulleys and bearings.
5. It lasts longer because it eliminates the two chief causes of belt wear—SLIPPAGE, which causes frictional heat, and DUST, which grinds away the face of the belt.

Why not try a VIM TRED Leather Belt in your own plant? If you try one you will buy more, because you will find—as thousands of engineers have already found—that VIM TRED will give you more production and lower your power transmission costs.

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seed oil. The linseed oil saturates the Parkerized coating and, as it oxidizes, provides an effective seal and further protection against moisture coming in contact with the underlying steel.

The illustration Fig. 2 shows a corner of the Parkerizing department in the Barber-Colman plant, Rockford, Ill. The Barber-Colman Company uses Parkerizing extensively on parts of textile machinery, which is one of the major products of this company. The set-up shown includes not only Parkerizing tanks for small, fine work, but the more sizable pieces as well, and they are prepared to furnish the more popular types of final finishes so that high grade work is assured.

In Fig. 3 a tire mould is shown as it is being lowered into a Parkerizing tank. At first thought it is difficult to comprehend the relationship between rubber and rust-proofing, but when it is understood that all tires are formed in steel moulds, the importance of rust-proofing becomes apparent.

In preparing the rubber that is to be vulcanized around the fabric carcass of the tire, it is important that no foreign matter be permitted to impregnate itself in the rubber, as even a very small object might cause an imperfection in the tire that would shorten its life and usefulness. For this reason, the United States Rubber Company Parkerizes all tire moulds and thus makes sure that no rust spots or pits form on the surface of the mould. The moisture and heat of the rubber-curing process, as well as the various chemicals used in rubber-making, are rust promoters. By treating the surfaces of the moulds in this manner, they are made rust-resistant.

The Parkerizing process plays its part in the sporting world, as evidenced by the success of Gar Wood's "Miss America X" in winning the

power boat event of the world and thus keeping the Harmsworth trophy on this side of the Atlantic. To make sure that the fuel passages would be 100 per cent clean, the manifolds and superchargers on the engines were Parkerized. If for any reason these superchargers had failed to deliver their full quota of gas to the engines the headlines would have carried an entirely different story and Americans

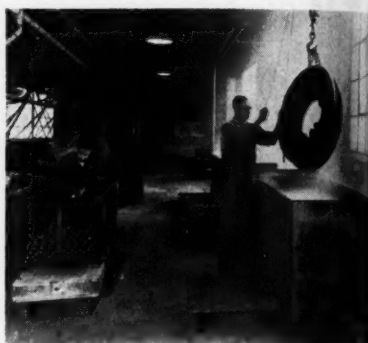


Fig. 3—A tire mould being lowered into a Parkerizing tank.

might have to sit on the banks of the Thames to see the 1934 Harmsworth classic.

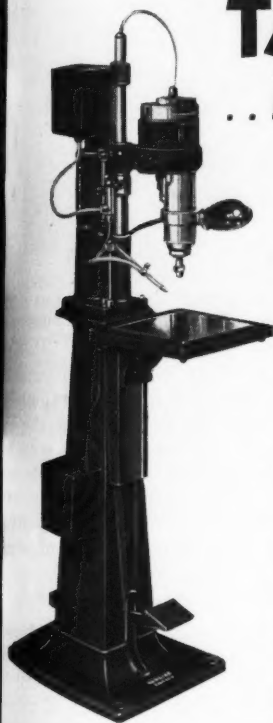
### Bonderizing

Aside from the problem of preventing the rusting of metal surfaces that do not require the application of paint, enamel, or other finish, one of the major difficulties in the manufacture of steel products has been the application of final finishes that will stay in place, hold their lustre, and prevent rust. Because of the hard, smooth, non-absorbent quality of steel it is difficult for paint to obtain a good grip or hold on such a surface. Full efficiency requires a closer, more tenacious union—a cohesive rather than an adhesive bond.

The solution to this problem has been found in a concentrated chemical

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Thru the combination of advantages found only in Haskins High-Speed Tapping Equipment, three to four more parts can be presented to the tapper and with less fatigue.

Tap breakage reduced to the minimum by the ever-rigid, sensitive spindle and the tapping mechanism.

The advantages listed are but a few of those found in a Haskins Tapper. Every convenience for the operator; every desirable mechanical feature. Tapping capacity in brass and non-ferrous metals up to 1/4"; in steel and cast iron, up to 3/16".

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### (3) DOUBLE-SPEED REVERSE

The tap comes out of the tapped hole at twice the speed at which it entered, thereby greatly increasing production speed.

### (4) POSITIVE LUBRICATION

Automatic oil pump delivers clean oil at the tapping point before each tapping operation.

### (5) LOW COST FIXTURES

As both hands are free to hold the piece, the fixture needed can be simple and free from costly clamps.

MANY OTHER  
VITAL FEATURES

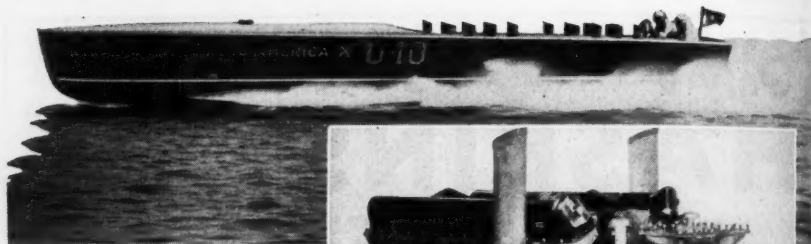


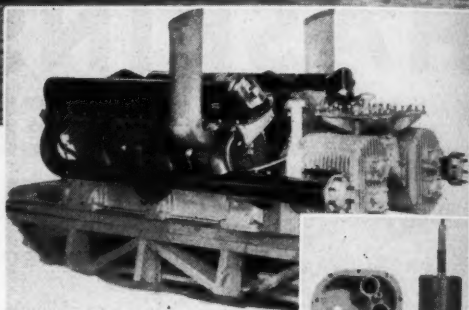
Fig. 4—Miss America X on a trial run.

which, when dissolved in boiling water, forms a solution that reacts quickly upon any iron or steel parts that may be immersed in it and changes the character of the surface of the metal to a highly rust-resistant non-metallic base to which final finishes will cling tenaciously.

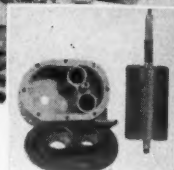
Bonderized metal is gray in color and velvety in texture. It is of such a character as to set up a capillary attraction, similar to the action of a wick, so that when paint, enamel, or lacquer is applied, a lasting bond is formed. Bonderizing is accomplished in a heated tank of suitable size to handle the desired production. The processing action is fast, requiring only five to six minutes immersion in the solution.

Chemical action is immediately apparent through the evolution of hydrogen, and as this action abates, the process is completed. The chemical action converts a microscopically thin portion of the metallic surface to millions of minute crystals, providing interstices into which the applied finish will flow. As this finish dries, it is securely anchored to the surface, forming a seal that is impervious to the most severe atmospheric conditions.

Perhaps the most important purpose for which the Bonderizing process is used is that of preventing rust



One of the engines used in Miss America X.



Details of supercharger.

on automobile fenders. The pleasure that the owner of an automobile takes in the appearance of his car can only be compared to his pleasure in the appearance of his home. Yet, with the thousands of cars on the roads and streets, it is inevitable that an automobile fender will accumulate its quota of dents and scratches, each one of which usually lays the surface of the metal open, more or less, to the elements.

If a deep scratch occurs on a fender that has been enameled over bare metal, a fine thread of rust will be observed in a few days and if nature is allowed to take its course, the rust will quickly spread to adjacent areas. This destroyer will soon creep back under the enamel and the small scratch becomes a large spot.

When the Bonderizing process is applied before the enamel is put on, the crystalline coating produced by the process not only provides an absorbent base on which the enamel finds a secure foothold, but as the coating is a non-conductor of elec-

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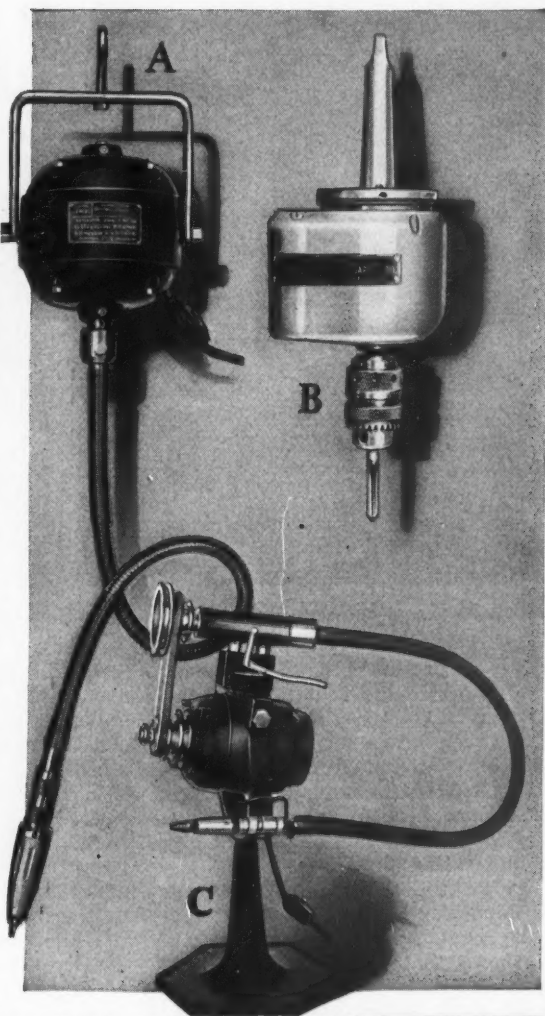
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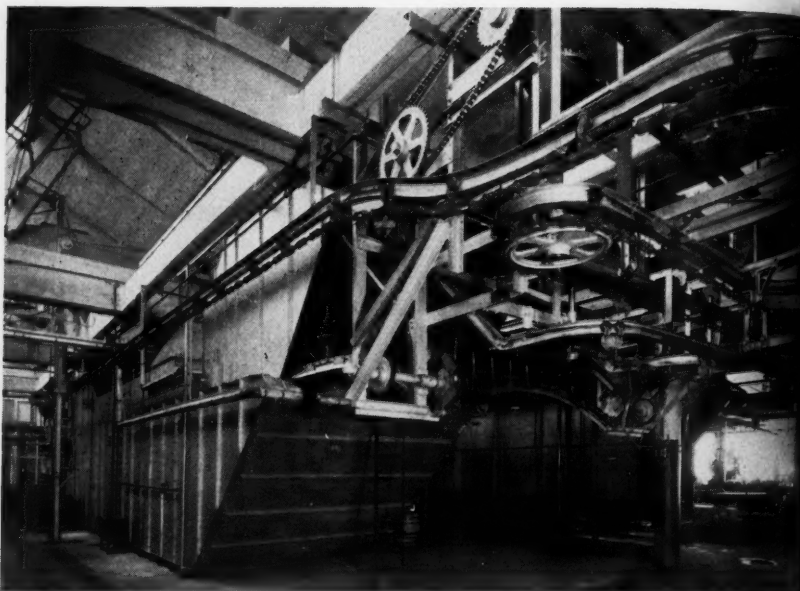


Fig. 5—Section of automatic conveyor system in automobile factory, showing entrance to Bonderizing tank.

tricity, it prevents the development of paint-destroying conditions around the point of fracture. In consequence of this fact, a number of the leading automobile manufacturers have installed Bonderizing equipment in their production lines and have included Bonderizing as a part of the standard manufacturing processes.

One of the finest factory set-ups for Bonderizing in the automotive industry is shown in Fig. 5. A check-up shows that 44 parts in the car made by this firm are Bonderized. Some of the more important parts to which the treatment is applied are fenders, running boards, hoods, radiator shells and grilles, and metal tire covers.

The high efficiency of this installation is due largely to an entirely automatic system of conveying the parts to be Bonderized from the

metal finishers, through the cleaning and rinse tanks, through the 12,000-gallon tank of Bonderizing solution, and through the drying ovens. Once a part is placed on the conveyor, it is not removed until it reaches the enameling room. Special time switches control the speed of the conveyor through the various solutions and the temperatures are controlled by thermostats.

While the use of Bonderizing is usually associated with the finishing of larger units such as automobile fenders, refrigerator cabinets, and so on, there are a lot of smaller sheet metal products which require rust prevention under the final finish. A good example of these are the window frame assemblies, such as automobile window guides and regulator channels made by the Excel Curtain Company of Elkhart, Ind., for use

Fig. No. 1

Figure 1—  
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and film sur

Figure 2—  
Two coats of  
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WRITE  
OF



# A Common Cause of Paint Failure and its Scientific Prevention



## Men who apply Enamel or Lacquer to Iron or Steel Should Read this Interesting Bulletin

Science is inquisitive. It is continually prying into the whys and wherefores of natural events. Since it has become a complement of business, it has made progress possible that compares with the rapid development of a naturally inquisitive child.

In prying into the cause of the very common phenomena of rust forming on steel surfaces, valuable facts have been uncovered.

Men have seen considerable sections of paint, enamel or lacquer lift from the surface of steel, surrounding a slight abrasion, for no apparent reason, leaving the metal bright and clean until corrosion appears, which develops rapidly on such exposed surface.

This bulletin deals with this common condition—a condition that shortens the life of practically all paint coatings on steel unless proper precautions are taken.

Write for your copy of this bulletin. You'll find it of utmost interest and value.

**PARKER RUST-PROOF COMPANY**  
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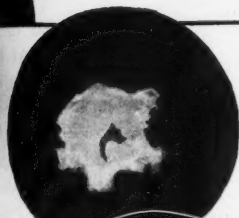


Figure No. 1

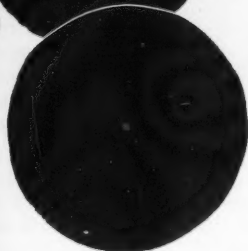


Figure No. 2

Figure 1—Untreated steel panel carrying two coats of baked enamel, pricked, and subjected to 228 hours in the salt spray. Rusted areas show where alkali destroyed enamel film surrounding rusted abrasion.

Figure 2—Bonderized steel panel with two coats of baked enamel, pricked and subjected to 228 hours in the salt spray. No rust occurs where metal was exposed, but no spreading of corrosion or rust to surrounding area.

on automobile convertible models. While these units are mostly concealed in the doors of the cars, they are exposed to moisture consisting either of dripping rain or condensation set up by exposure to extremes of heat and cold.

Any accumulation of rust on these parts is liable to cause sticking and binding windows, which are, as any driver will testify, a nuisance. By using Bonderizing on the perfectly-

the huge vats in which the beer is stored while it is aging.

Most of the equipment could be furnished with a fair degree of promptness, but the old-time wooden keg proved to be a stumbling block. Besides money and machinery, it takes time to go into the woods and get out the timber, saw and season the staves and cooper the barrels. In all, it requires about a year and half from the cutting of the tree to

the pouring of the pitch lining for a completed beer keg.

In this dilemma the industry turned to steel barrels, but these lacked some of the desirable qualities of a beer container, one of which was the ability of the steel to form the necessary bond with the pitch lining. This problem has been solved by a number of the

more prominent manufacturers of steel barrels through the use of Bonderizing. One firm is now Bonderizing 7,000 barrels every twenty-four hours.

The production equipment in one plant is so arranged that the loads of sheet steel roll into the plant at one end and the completed barrels roll out at the other. At the proper place in the long string of operations is the equipment for Bonderizing the barrel in preparation for its final finish and the pitch lining. At the ends of a set of three large tanks filled with heated chemical solution, we see the barrels submerged by force and, as they pass through the

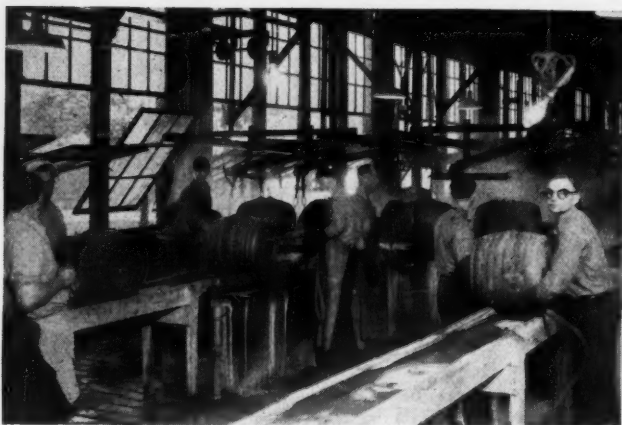
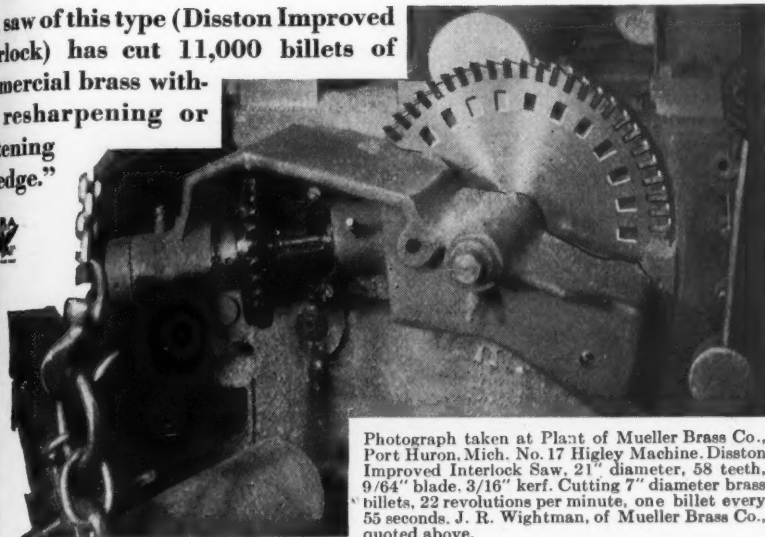


Fig. 6—Steel beer barrels as they come from the Bonderizing tank in the background.

formed guides and channels, rust-free operation is assured for the life of the car. While these parts are not prominent, the finishing color may be made to harmonize with the surrounding equipment. The cross-section drawing Fig. 6 shows the design of the channel and guide.

One of the more recent of the wide-spread applications of the Bonderizing process has resulted from the revival of a large industry—the brewing of lager beer. Immediately upon the passage of legislation legalizing beer, the manufacturers of brewing equipment were deluged with orders for everything from bottle openers to

... saw of this type (Disston Improved Interlock) has cut 11,000 billets of commercial brass without sharpening or tightening wedge."



Photograph taken at Plant of Mueller Brass Co., Port Huron, Mich. No. 17 Higley Machine. Disston Improved Interlock Saw, 21" diameter, 58 teeth, 9/64" blade, 3/16" kerf. Cutting 7" diameter brass billets, 22 revolutions per minute, one billet every 55 seconds. J. R. Wightman, of Mueller Brass Co., quoted above.

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tanks, the chemical reacts on the steel, producing a surface to which the paint on the outside, and the pitch on the inside, will cling.

While the Bonderizing chemical reacts on the steel, it is absolutely harmless to the person or clothing. In fact, after the keg is pitched and painted, the Bonderized surface is completely covered, building an impenetrable barrier between the beer and the metal and holding the pitch so that it will not become dislodged by shock or washing. With this combination of Bonderizing and pitch, the steel barrel manufacturer is able to produce a barrel with all of the desirable qualities of the old-time keg.

## Die Casting: An Asset to the Metal-Working Shop

(Continued from page 12)

the other. There are, however, fields in which either is applicable and in such cases both should be investigated. Much the same may be said also as between sand castings and die castings. No one process of making metal parts ought to be used to the exclusion of another unless its superiority in the particular circumstances is so clearly established as to be beyond question. Since die castings are newer and not so well known as stampings or sand castings, these advantages may be overlooked.

It ought, perhaps, to be emphasized that the faults resulting from improper metallurgical practice once encountered in die castings of the zinc-base type (which is now the type finding widest use) have long since been overcome in shops that are carefully and intelligently run. The use of high-purity zinc and the rigid exclusion of all contamination from scrap and other sources is essential. For this reason, care should be exercised to

secure zinc die castings only from shops where these facts are known and where proper precautions against contamination are enforced.

## Hard-Facing With "Stellite"

Recent news that the life of truck and bus valve seats has been increased from 10,000 to 150,000 miles without regrinding by simply making them of a harder and more wear-resistant alloy has more than ever focused attention on the hard-facing process. Increasing the life of tools and parts that are subject to wear by facing them with a wear-resistant material has become standard practice in many industries, and this method is being applied to valve seats, plow shares, dies, oil well drilling bits, dipper bucket teeth, airplane tail skids, and many other metal parts that are subjected to abrasive action.

The wide acceptance of hard-facing during the past few years is a direct result of the inherent economies of the process. Of primary importance is the longer life of hard-faced parts, which means fewer replacements, with resultant savings in labor charges and lost production. Hard-facing permits the utilization of cheaper base metals for wearing parts and a further saving lies in the possible salvaging or reclaiming of worn parts. The efficiency of hard-faced parts is improved because these parts retain their condition. The net results of these cost-reducing features is a general increase in operating efficiency.

These and many other hard-facing applications are described in a 96-page booklet titled "Hard-Facing With Haynes Stellite Products", which is being issued by the Haynes Stellite Company, Kokomo, Indiana. A detailed description is also given of various hard-facing materials and the correct procedure for their application by both the oxy-acetylene and electric-arc processes. Other sections of the book include descriptions and illustrations of jigs and fixtures for facilitating hard-facing operations, tables for estimating hard-facing costs, and a list of ferrous and non-ferrous metals and alloys showing what materials can or cannot be hard-faced. Copies of the book will be furnished upon request.

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from chrome steels to wire rope with 100% satisfactory results. Users report 4 to 12 times as long life as the hack saw blades they previously used. "Moly" hack saw blades cost less and give more cuts per dollar. Requisition your supply house for the genuine "Moly" blade.

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# Electrical Heat Treating Furnace is Economical

By FRANCIS A. WESTBROOK, M.E.

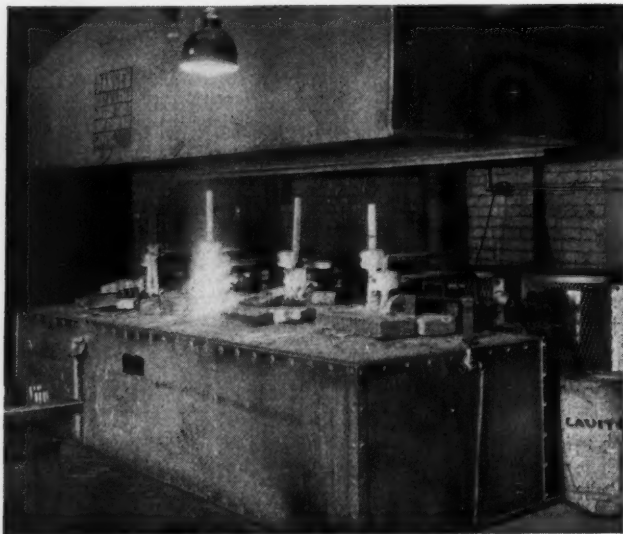
**T**HROUGH the use of an electric furnace of modern type, operated according to the newest methods, a number of outstanding economies have been effected at the plant of the Youngstown Sheet and Tube Company. For instance, the number of work-pieces that can be threaded with a single tool, without regrinding, has been increased from 400 to 750—a result of using the electric furnace to harden the tools.

The furnace is shown in the illustration. It has four pots, in the first of which the tools are preheated to a temperature of 1400 degrees. At this point the tools are transferred to the second pot, which is operated at 1850

degrees, and when the tools have been thoroughly saturated at this point, they are transferred to the third pot, in which a high heat of 2300 to 3250 degrees is obtained. The fourth pot is the "quenching pot", in which a heat of 1100 degrees is maintained.

The current for heating is fairly evenly divided among the first three pots; thus three single-phase transformers can be connected to a three phase circuit. The fourth pot is kept hot by the work quenched in it. With a bank of three 25 kva transformers it has been found possible to harden more than 200 pounds of high speed steel per hour, using the equipment described above.

The furnace is of the internally-heated salt bath type. The pots, being metal, form one electrode, the second electrode consisting of a metal bar immersed in the bath. Heat is, of course, generated by the passage of current through

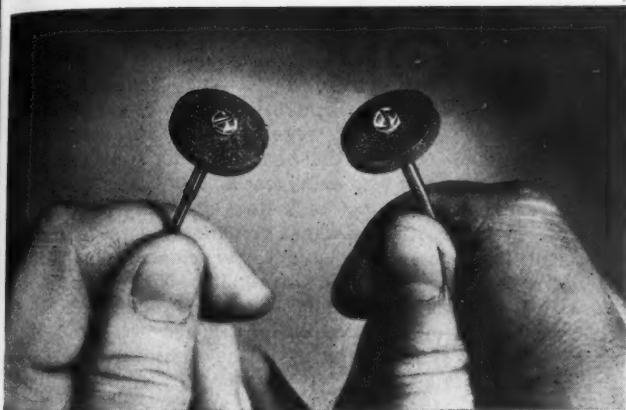


Electric furnace used for heat treating tools at the plant of the Youngstown Sheet and Tube Company.

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the relatively high resistance of the bath between the metal wall of the pot and the immersed electrode. Thus practically all of the power delivered to the furnace is converted into heat at the point where it is used, and pot failures have been eliminated. Of course, variations of design are possible whereby multiple electrodes may be used, making possible the use of larger furnaces that will accommodate, for instance, tubes 20 feet long or heavy charges of wire for annealing at the rate of 1,000 pounds every five minutes.

The voltage of the heating current varies with the size of the pot, the conductivity of the bath, and the nature of the work, but it usually ranges from 10 to 40 volts. As shown in the illustration, it is convenient to have the transformers close to the furnace, taking current from the regular plant circuit. In some of the recent installations, such as the one under discussion, two to four voltage taps are used, the higher one for full capacity operation and the lower ones for reduced loads or simply to maintain the bath in a molten condition. In the plants of the International Nickel Company of Meridian, Conn., and the Consolidated Ashcroft Hancock Company of Bridgeport, Conn.—both plants in which a wide variety of products are manufactured—taps have been provided on the transformers for the furnaces for annealing stainless steels at 1850 deg. F., for annealing sterling silver at 1250 deg., and for annealing nickel silver at 1450 deg. F.

Heat losses are reduced to a very low point by insulating the pots, and it has been found in practice that when everything is working properly, the losses due to radiation are so small that practically all the current actually used is the amount necessary to heat the work. Another important

advantage of this type of furnace is that as the parts are submerged, they are protected from the air and other gases which would tend to oxidize them and dull their brightness. This fact, together with the close control of the heat, has made it practicable in many cases to do the heat treating as a final operation and to omit the usual grinding and polishing after hardening, thus materially reducing costs. Handling the work in this manner applies particularly in the cases of high speed steel and alloys, resulting in the elimination of troubles due to scaling, pitting, and dimensional changes.

In addition to the advantages enumerated above, the use of such a furnace as that shown in the illustration precludes the possibility of gases or noises, eliminates any need for piping, is simple to install, and inexpensive to operate.

**THERMIT WELDING.** This booklet, containing eight 8½ x 11-in. pages, discusses and illustrates the use of the Thermit Welding Process for joining rails and for making repairs to locomotive frames, metal marine work, heavy machinery, large gears and pinions, and other similar work of all kinds. Cost figures showing the costs of making repairs by the Thermit Weld Process are compared to the cost of new parts are included. Copies gratis. Write to Metal & Thermit Corporation, 120 Broadway, New York, N. Y.

**"HOISTS".** Bulletin No. RH-1, issued by The Harnischfeger Corporation, 4400 West National Avenue, Milwaukee, Wisconsin, treats upon the application of hoists to both general and specific problems, for every plant and purpose. Profusely illustrated in color with photographs of installations and diagrams explaining simplified construction and operation, it covers the vital points in modern hoist design. The bulletin lists the ratings and operating ranges for type "R" hoists along with specifications and electrical accessories. Copies may be had upon application to the Company's agents and representatives or to the factory directly.

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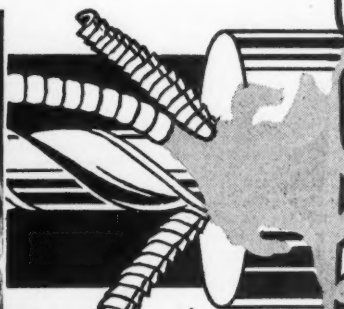
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## IDEAS FROM READERS

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

### Equalizing Pressure in Clamping Work

BY CHARLES KUGLER

THE drawings show the design of two attachments for vise jaws by means of which the pressure that is brought to bear on the work can be equalized. The devices were designed

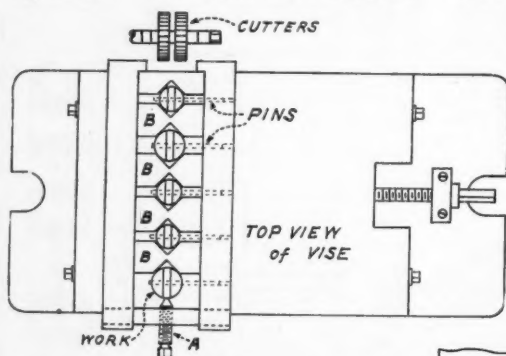


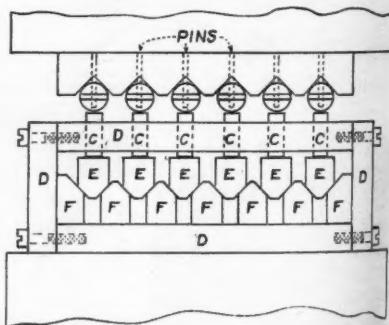
Fig. 1 (Above)—Drawing showing method of equalizing the pressure on the work held in a machine vise. Fig. 2 (Right)—This vise may be operated faster, but work-pieces of varying diameters will not always be located centrally.

by the writer and built for use in a plant engaged in the manufacture of dairy machinery.

In both instances the work rests on round pins which are held in the bottom of the stationary vise-jaw; thus the time required to keep the work free from chips and dirt will be reduced to the minimum. The method shown in Fig. 1 involves the use of a series of V blocks B of even length,

set into the vise with the jaws just tight enough so that the blocks can slide easily. With the jaws properly set, a plate is anchored across the ends of the jaws to carry a set-screw A by means of which the blocks are tightened to grip the work. By using this equipment, not only will the pressure be equalized on work that varies in diameter, but the work-pieces are also centralized so that all centers will be in line. Thus if the operation consists of milling tongues, as shown, each tongue will be milled in the center of the piece.

In Fig. 2 is shown another method of equalizing the pressure on work that varies in diameter, but in this case the tongues will not always be milled in the centers of the pieces. The advantage of this



design lies in the fact that the work-pieces are clamped in position by means of the vise-screw rather than by the use of setscrews; thus more

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pressure can be applied and it is possible that the clamping action is quicker.

The equipment shown in Fig. 2 involves the use of a single block in which six notches are milled for six work-pieces. Pressure is applied through the moveable vise-jaw, acting against the box-like structure formed by the four pieces D. These pieces are held together by screws, as shown. In the box are the seven pieces F and the six pieces E, all of which are milled on the contacting ends so that, as the vise-jaw is tightened, the pieces will be pushed forward against the ends of the pins C, which in turn are pushed out through the holes in the piece D and against the work. Any variation in the diameter of the work-pieces will cause the blocks E and F to slide and adjust themselves to compensate for the variations so that the pressure on all work-pieces will be equal.

The blocks E and F are protected against chips and dirt by sheet metal plates which are attached by means of screws so as to cover both the top and the bottom of the box formed by the pieces D.

## Removing a Broken Tap from a Casting

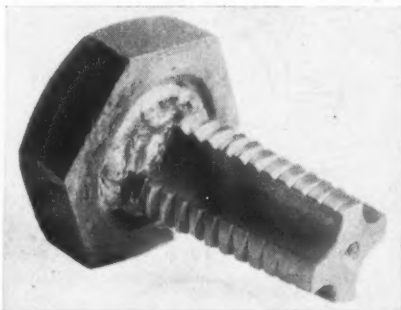
BY FRANK J. HUGHES

UNDOUBTEDLY every mechanic who has worked long at his trade will understand the writer's state of mind when a  $\frac{3}{4}$ -in. tap broke off in the hole in a casting that was slated for delivery within a few hours. In fact, the job was being rushed as much as possible, which might account to some extent for the accident.

The tap broke off about 3/16 in. below the surface of the piece. We tried backing it out with a chisel; we

tried to turn it by means of a wrench and wires inserted into the flutes; we tried to shatter it by means of a hammer and punch—in fact, we tried every means we knew to get the tap out, but without success. It looked as though the casting would have to be scrapped at the last minute.

As a last resort, I tried the weld-



Photograph of broken tap to which a nut was welded so that the tap could be removed from the hole.

ing torch. I placed a half-nut over the hole and then built up the end of the tap by depositing weld metal, allowing the metal to sag into the flutes of the tap. As the metal was built up, it joined the metal of the nut, forming a solid piece. Within five minutes from the time I started, we were able to remove the tap from the hole by using a wrench on the nut.

The illustration shows the nut and piece of broken tap, welded together as they were removed from casting.

## Solving Driving Box Difficulties

BY HOMER SHELTON

A large lumber company which maintains a dozen locomotives of a small type built 15 or more years ago recently had an epidemic of hot

driving boxes. The road runs 75 miles over the mountains, and as it is very rough and crooked, there was also plenty of grief on account of cut wheel flanges and driving box and truck lateral. Engines that had just been shopped gave the most trouble, although the greatest care was used in adjusting the driving box wedges.

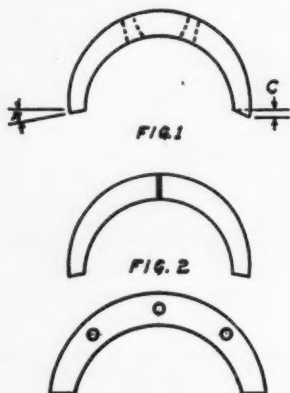


Fig. 1—Drawing showing how angle A on crown brass was increased. Fig. 2—Illustrating manner in which brass was split on center line, and showing design of "keeper" used with two-piece floating brass.

These were set up tight and then pulled down  $\frac{3}{16}$  in. or nearly  $\frac{1}{32}$  in. loose.

It was believed that more lateral motion was needed on account of the numerous sharp curves, and the allowance was increased from  $\frac{3}{16}$  in. to  $\frac{1}{2}$  in. on driving wheels, and to  $\frac{1}{2}$  in. on trucks and trailers. Bald tires (tires having no flange) were put on the main drivers. This eliminated excessive wear on the lateral faces of the boxes, but hot boxes and burned-up journals continued. The boxes were bored  $\frac{1}{64}$  in. larger than the journal and were scraped and filed in accordance with standard practice.

After making a trip, however,

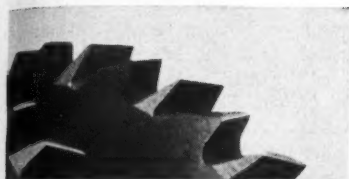
small particles of brass, like brass filings, were noticed in the grease near the brasses. It was often necessary to drop wheels with badly cut journals, burned blue, and showing "thermal checks" or tiny cracks parallel to the axle. These journals were lubricated with the conventional type of grease cellars used on practically all railroads. The grease is pressed upward against a perforated plate which bears on the journal by a spring under a follower plate in the bottom of the cellar. At length a different alloy was specified for the material of the crown brasses.

In the meanwhile, the master mechanic ran a series of tests, for which an old lathe was used. The end was sawed off a scrap axle, and this was chucked in the lathe and a true journal surface turned and rolled on it. A driving box was fitted to this dummy journal with a spring and turnbuckle arrangement for applying pressure so that a condition similar to actual service under load could be obtained. It did not take long to discover that the grease was not getting to the bearing in the quantity needed. The tension of the grease spring in the cellar was not great enough to press the grease thru the  $\frac{1}{8}$  in. holes in the perforated plate, especially in cold weather when the grease is almost as thick as soap.

Another spring, having a tension of 70 pounds at working height, was substituted, and some perforated plates with  $\frac{3}{16}$  in. holes were obtained. Two feeder grooves  $\frac{1}{8}$  in. wide and  $\frac{1}{8}$  in. deep were cut on the back side of the driving box brass. It was found that the grease was fed to the bearing properly; but when the brass heated (grease boxes run much warmer than oil lubricated boxes) the brass had a tendency to close on the journal. The angle of the edges of the brass, shown at A



May, 1934



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**BARBER-COLMAN COMPANY**

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

in Fig. 1 was increased until distance C was about a half inch, but this did not entirely correct the trouble.

The shop management was familiar with experiments conducted on other roads, using floating bushings cut in two or three sections in a special driving box (used on the Canadian National railroad) and tried using a two piece crown brass in the original box, machined to the same size as the box instead of a press fit. A keeper was fitted to the inside of the box, as shown in Fig. 2 to prevent it from working out. After a thorough trial this type of driving box brass was adopted as standard, as none "burned up", even under adverse conditions. The two piece brass showed no tendency to close on the journal and no further trouble was experienced.

## Photoelectric Relay Controls Spring-Testing Machine

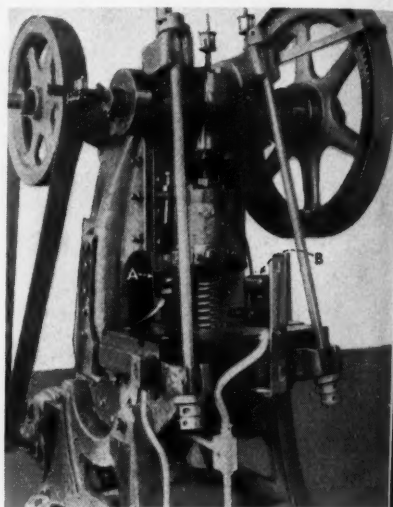
BY R. B. REID

**I**N the shop of the Material Division, U. S. Army Corps, at Wright Field, Dayton, Ohio, an old punch press is used as a fatigue testing machine for shock absorber springs. The spring to be tested is placed in position under the ram of the machine, then the machine is started and operated continuously, twenty-four hours a day, until the spring fails. A small counting device, attached to the ram, keeps accurate count of the number of times the spring is compressed before it gives out.

One of the difficulties encountered after this equipment was put into operation was that the spring would break during the night, or at a time when there was no attendant near, and since the machine would continue to operate, an incorrect number of compressions would be recorded on the counter.

The problem was solved by in-

stalling a General Electric photoelectric "eye", or relay, in such a position that the beam of light from the cell would pass beneath the bottom of the ram when in its lowest position. As long as there is a spring in position under the ram, the spring intercepts the light beam and pre-



Press used as a spring-testing machine, equipped with a photoelectric relay to stop machine when spring breaks.

vents it from reaching the phototube. When the spring breaks, however, it collapses and leaves a clear passage for the light beam. When the beam strikes the phototube, a relay is actuated which shuts off the motor and stops the machine. In the illustration the photoelectric cell is indicated at B and the phototube at A.

## Third Solution to Mr. Hinman's "Trig" Problem

BY A. R. KLIGMAN

**I** READ the interesting problem which was described by Mr. C. W. Hinman in the February issue of

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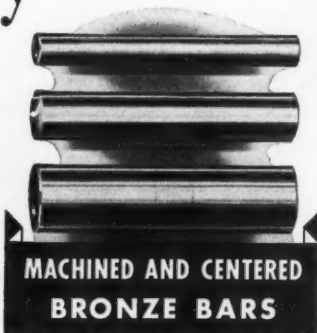
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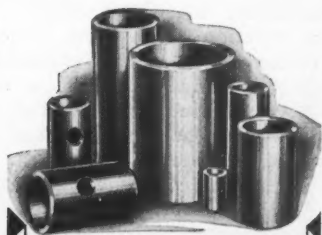


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**LEAD BASE BABBITT**

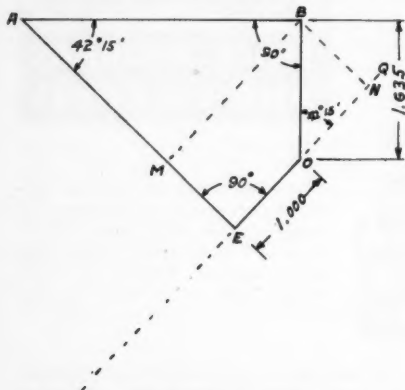
Those who use it say that Bunting's Lead Base Babbitt is the greatest industrial Babbitt ever developed. A trial will tell you all about it.



**BUNTING**  
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**SUPERIOR LEAD BASE BABBITT**

**MODERN MACHINE SHOP.** While the solution given there is both ingenious and correct, it is rather cumbersome. Mr. Hinman, as well as others of your readers, may be interested in the simpler solution submitted herewith.

To solve, BM and BN should be



erected perpendicular to AE and extended EO respectively, and BM should be equated to EN and EO + ON.

$$BM = AB \times \sin 42 \text{ deg. } 15 \text{ min.} \quad (1)$$

$$EN = EO + ON = 1.000 - 1.635 \times \cos 42 \text{ deg. } 15 \text{ min.} \quad (2)$$

From which follows:

$$AB \times \sin 42 \text{ deg. } 15 \text{ min.} = 1.000 + 1.635 \times \cos 42 \text{ deg. } 15 \text{ min.} \quad (3)$$

or:  $AB = 3.287$ .

In addition to the evident simplicity, this method has the advantage of not requiring that ingenuity in trigonometrical manipulation of complex expressions (sine of the difference of two angles, in this case) which Mr. Hinman displayed. Indeed, the two construction lines BM and BN need not be introduced and only a simple line of reasoning has to be followed if Method of Projections described by the writer in the August 1931 issue of Product Engineering is applied.

Note that in the quadrangle ABOE

all angles and two sides are given, and only two other sides are not known. Of these AB is the dimension wanted, while AE is irrelevant. Following this method we project the whole quadrangle upon PQ. Since AE is the perpendicular to PQ, it is eliminated and we are led directly to the equation (3).

## Finding Diameter of Work When Center is Inaccessible

BY R. T. GRIFFITHS

ON page 27 of your December issue was given a method and formula for ascertaining the diameter of a circular piece when the center is not accessible. The formula given was

$$D = \text{Dia.} \left( \frac{1}{2} C \right)^2 + H^2$$

H

For the benefit of machine shop men who prefer an easier method of handling such a problem, I offer the formula

$$\frac{4}{H} + H = \frac{4}{.975} + .975 = 5.077$$

This method eliminates necessity for squaring the height and saves time. It also narrows the possibility of errors in calculation.

## "Landis" Collapsible Taps Supersede "Victor"

The Landis Machine Company, Waynesboro, Pa., announces that its "Victor" Plant, also located in Waynesboro, will henceforth be known as "Landis Machine Company, Tap Division".

This change in name has been brought about by the fact that the new line of collapsible taps recently placed on the market will be known as "Landis Collapsible Taps". The manufacture of the older line of Victor taps has been discontinued, being superseded entirely by Landis taps of the newer design.



Style O Mounted in T-slot  
4 Operations with 1 set-up

## Improved McCROSKY TURRETS *for engine lathes*

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You can bring any diameter of stock from  $\frac{3}{8}$ " to  $3\frac{3}{4}$ " to center quickly and automatically and accurately if your lathe is equipped with a McCrosky Self-Centering Steadyrest.



## McCrosky Self-Centering Steadyrest



McCrosky Bulletin No. 13-C gives complete specifications of Improved McCrosky Turrets and Self-Centering Steadyrest. Ask for a copy.

# McCROSKY TOOL CORPORATION

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Sales Offices: Chicago, Cleveland,  
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## Over the Editor's Desk

### Moving Day

**M**ODERN MACHINE SHOP has moved! Born six years ago amid the hum of cylinder presses and the aroma of printer's ink, it had long since outgrown its former quarters and has now secured more spacious ones.

We are now located in the Commercial Arts Building, 704 Race St., Cincinnati, Ohio. The latch-string is always out for our clients and readers, and if we can be of any assistance to any who may visit Cincinnati, we shall welcome the privilege.

"Come up and see us some time."

### Automobiles and Prosperity

**T**HE automobile industry is so huge, and is responsible for the employment of so many people, either directly or indirectly, that it has come to be regarded as a sort of barometer of business conditions by a large part of the population. And so much has been happening in and around Detroit these last few weeks that your editor took a few days out to see just what is going on up there.

Detroit is busier than it has been in nearly five years. Every plant that we visited is humming at top speed, and in practically every case is so filled with materials and workers that it is difficult for a visitor to keep out of the way. This is not a normal condition; under ordinary circumstances an automobile factory is the last word in manufacturing efficiency, but the demand for cars has increased at such a rapid rate that there has been neither time nor opportunity to store the materials in systematic order.

It is true that there have been a number of strikes and labor disorders, but such questions as have arisen between the employers and the work-

ers have been settled almost immediately and to the satisfaction of all concerned, so apparently the industry is all set for full steam ahead. In one of the plants that we visited we overheard a statement that orders during the past month have doubled, whereas production has remained stationary.

Chevrolet dealers delivered, during the month of March, more than 97,000 cars—the largest total since March, 1930. Production at the Ford plant is now running in excess of 90,000 cars and trucks per month, with a total in April of over 100,000 units. Sales of Hudson and Terraplane cars during the week ending April 14 ran 309.6 per cent above the same week a year ago with approximately 3,700 units shipped. The present production schedule at the Hudson plant is 21,000 cars a month. Cadillac and LaSalle deliveries during the first ten days of April were 235 per cent over the same ten days of last year, with nearly 4,000 unfilled sales orders at the factory.

In taking stock of business condition in the automotive industry, we must not overlook the accessory plant. Automobiles have to have bodies; thus in trying to keep up with the demand the Murray Corporation of America, automobile body and appliance firm, is breaking all record with 12,000 employees on its rolls. The A. C. Spark Plug Company now has 7,000 people on its payroll—approximately double the number employed a year ago.

With orders piling up day by day, it would appear that the automobile industry is in for a considerable period of prosperity. And as long as the automobile industry is prosperous, we can be pretty sure that the country in general will be, also.



# Banish Uproar with FORMICA GEARS



THE piercing shriek of metal to metal is never heard in gear drives where Formica is used. The operation of Formica equipped machines is silent and smooth. They sound well taken care of. And such machinery is easier to sell.

Any of the gear cutters named can give you prompt service on one or many gears.

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- Slaysman & Company  
Baltimore, Md.
- Harry A. Moore  
Bangor, Me.
- The Union Gear & Mch. Co.  
Boston, Mass.
- The Atlantic Gear Works  
New York City
- Chicago Rawhide Mfg. Co.  
Chicago, Ill.
- Perfection Gear Company  
Chicago, Ill.
- Merkle-Korff Gear Co.  
Chicago, Ill.
- Chicago Gear Company  
Chicago, Ill.
- The Cincinnati Gear Co.  
Cincinnati, O.
- The Horsburgh & Scott Co.  
Cleveland, O.
- The Stahl Gear & Machine  
Co.  
Cleveland, O.
- The Master Electric Co.  
Dayton, O.
- The Adams Company  
Dubuque, Ia.
- The Ferguson Gear Co.  
Gastonia, N. C.
- Hartford Special Mch'ny. Co.  
Hartford, Conn.
- Beatty Machine Works  
Keokuk, Ia.
- The Generating Gear Co.  
Milwaukee, Wis.
- Badger State Gear Co.  
Milwaukee, Wis.
- Precision Machine Co.  
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- Sier-Bath, Inc.  
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- The Eagle Gear & Mch. Co.  
Philadelphia, Pa.
- Rodney Davis and Sons  
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- The Pittsburgh Machine  
& Supply Co.  
Pittsburgh, Pa.
- Standard Gear Co.  
Pittsburgh, Pa.
- H. W. Honeyman & Son  
Providence, R. I.
- Perkins Machine & Gear Co.  
Springfield, Mass.
- Winfield H. Smith, Inc.  
Springville, N. Y.
- Ailing Lander Company  
Sodus, N. Y.
- Charles E. Crofoot Gear  
Corp'n  
South Easton, Mass.
- Arlington Machine Co.  
St. Paul, Minn.
- Farwell Mfg. Co.  
Toledo, Ohio
- Diefendorf Gear Corp.  
Syracuse, N. Y.
- Worcester Gear Works  
Worcester, Mass.
- Massachusetts Gear &  
Tool Co.  
Woburn, Mass.

## NEW SHOP EQUIPMENT

### B & S No. 2 Universal Light Type Milling Machine

Designed to offer unusual value where the work is of the lighter class and embodying many advanced points of design, the No. 2 Universal Milling Machine shown in the illustration has been brought out by Brown & Sharpe Mfg. Co., Providence, R. I.

Contrary to the trend of machine tool

Motors can be supplied for usual voltages, alternating or direct current.

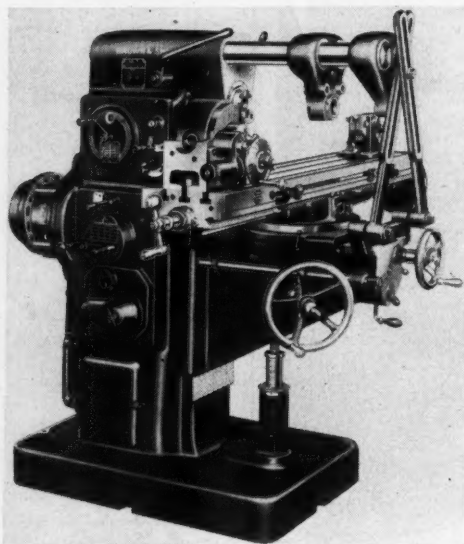
The spindle height has been lowered to give a more convenient height for vision of cutters and work, which is an advantage on light toolroom work. A wide range of speeds has been provided to meet a variety of requirements, the speeds being arranged in two series giving 16 spindle speeds from 40 to 1,300 r.p.m.

Changes are made by a rotating lever on the side of the column, working in conjunction with the back gear and high and low series lever, one-quarter revolution of the rotating lever giving a change in speed in the series engaged.

Convenient single lever feed control is also provided for the 16 feed changes from  $\frac{1}{2}$  in. to  $18\frac{1}{4}$  in. per min., one revolution of the lever giving a change in the feed rate. Directional longitudinal feed engagement is provided on the front of the table, in addition to the transverse and vertical feed engagement levers on the side of the knee. A change from the usual design of the column has been made so that the face on which the knee rests is set back approximately 4 in. from the end of the spindle, providing added clearance for fixtures or work.

All heat treated alloy steel gears are employed in both the feed and speed mechanism and ground-tooth gears are used throughout in the speed train. Regardless of the speed engaged, the spindle drive is always through the spindle gear mounted on the spindle directly behind the front bearings and driven through six integral splines. All driving shafts in the column are splined and mounted on anti-friction bearings. All mechanism within the column is lubricated by a pressure oiling system, operated by a plunger-type pump mounted on the side of the column.

A tank for coolant is provided in the base of the machine and provision is made for a compact, individual motor-driven centrifugal coolant pump, the wiring being arranged so that the pump will operate only when the machine is in operation.



B & S No. 2 Universal Light-Type Milling Machine

design during recent years toward increased size and weight with added horsepower, multiplicity of controls, and so on, the No. 2 machine is of simplified design and not-too-heavy proportions so as to permit sensitivity and easy handling, while at the same time insuring rigidity and accuracy.

The machine is a self-contained motor driven unit, the motor pinion meshing with an internal gear on the main driving shaft. All wiring is enclosed and fully protected, yet easily accessible.

The usefulness of the machine can be augmented by the use of a Universal Milling Attachment with Crane, furnished as an extra, which permits the attachment to be swung aside, yet remain instantly available. The wide range of adjustment of the attachment, together with a speed range of from 82 to 2672 r.p.m., provides a means of handling a great variety of work requiring end mills from 2 3/4 in. diameter to the tiny end mills used in die and mold work. Short leads and fine feeds can be obtained by means of an attachment that is driven from the table screw. Feeds 1/20 of normal are available when geared to the worm of the headstock, and extremely fine leads 1/800 of normal, when geared direct to the headstock spindle.

The capacity of the machine is: longitudinal feed, 28 in.; transverse feed, 10 in.; vertical feed, 15 in., all automatic. Universal spiral index centers swing 10 in. in diameter and take 28 in. in length. Net weight of machine, 2,700 lb. including motor which is standard equipment.

### Landmaco Threading Machine in 2 In. and 2 1/2 In. Sizes

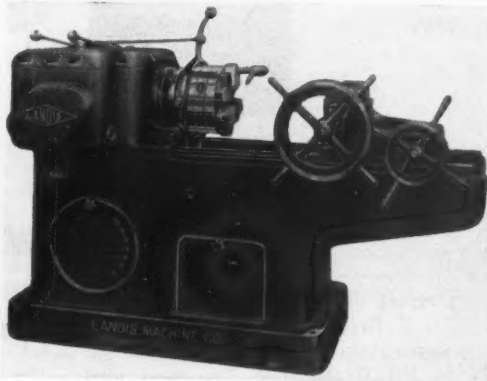
The Landis Machine Company, Inc., Waynesboro, Pa., is now offering the Landmaco Threading Machine in the 2-in and 2 1/2-in. sizes. The new machines have capacities from 1/2 in. to 2 in. and 1/2 in. to 2 1/2 in. respectively, and are made in both the single head and double head models. Both sizes and models can be equipped with lead-screw attachments.

The 2 and 2 1/2 in. Landmaco Threading Machines are patterned closely after the smaller machines and have the same distinctive features of design including the geared headstock with chrome nickle steel gears, spiral bevel gear spindle drive, anti-friction shaft and spindle bearings, built-in reversible coolant pump, friction clutch control, double wall bed, covered guides and so on.

The new machines are notably sturdy and rigid in construction and have a wide speed range. All controls are centralized and within easy reach of the operator. Particular care has been exercised in the design of the machines to provide maximum ease of operation.

### Hammond Extra Wide Swing Polishing and Buffing Lathe

A polishing and buffing machine designed with extra wide swing, as shown in the illustration, has been placed on the market by Hammond Machinery Builders, Inc., 1617 Douglas Ave., Kalamazoo, Michigan. The machine is intended for use in finishing unusually large parts without interference from the base; thus it consists of a standard "Rite-Speed" Polishing and Buffing Lathe base with extended bearing housings carrying the outer bearings close to the polishing wheels. The distance from the side of



Landmaco 2-In. and 2 1/2-In. Threading Machine

the base to the inside of the wheel is 30 inches.

The spindle of the lathe is 110 inches long, and is mounted on four oversize precision ball bearings. The lathe can be powered with motors up to and including 10 h.p. Provision is made for mounting the motor in the base, and power is transmitted from the motor to the spindle by V-belt drive.

All the features of the Hammond "Rite Speed" line of polishing machine are incorporated in the design of this machine, including the means for changing V-belts without removing the spindle from the bearing housings or removing ball bearings from the spindle. The complete spindle and bearing housing assembly can be removed from the base of the machine in a few minutes. The switch and brake are in combination, operated by a lever which also controls the master switch and provides overload

and low voltage protection. The current is cut off before the brake is applied.

The starting switch is mounted on the front of the lathe, and the motor cannot be started until the brake is released. Special attention is given to bearing seals

except for size, is a faithful reproduction of the larger rocking electric furnaces. It will melt iron, alloy steel, copper, brass, or other metals with the speed, economy, and analysis control for which these furnaces are well known.

The development of this small furnace as a part of the standard line was prompted by the keen interest of college

engineering shops and laboratories in recent metallurgical developments. The requirements for speed in melting and shorter cycle heat treatment have been met by the electrical furnace, (especially as regards the ferrous field) and a demand has been created among practical foundrymen and metallurgists for a small unit to serve as a pilot instrument to aid in directing large production runs, as well as for special heats of from 50 to 100 pounds.

The furnace is completely equipped with transformer, control panel, switches, meters, and rocking mechanism. It has a nominal rating electrical of 20 kilowatts and may be connected to any industrial power supply.

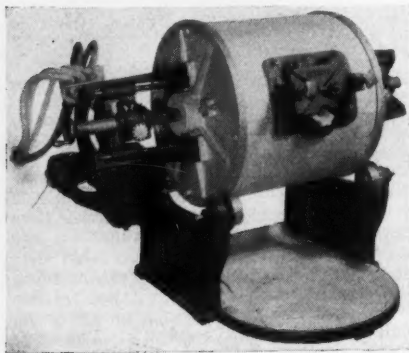
**Hammond Extra  
Wide Swing Polishing  
and Buffing  
Lathe**



for preventing foreign matter from entering the bearing housing. Proper tension of the V-belts is obtained by loosening one bolt, allowing the weight of the motor to set the tension. Tightening the belt again locks the motor in position.

### Detroit "Small-Lot" Rocking Electric Furnace

A rocking electric furnace of from 25 lb. to 100 lb. capacity has been announced by the Detroit Electric Furnace Company, 827 W. Elizabeth St., Detroit,



**Detroit "Small-Lot" Rocking Electric Furnace**  
Michigan. The unit was designed for either production or experimental melting of small lot runs of metals, and,

### Wells Band Saw For Cutting Metals

A band saw especially designed and built for cutting metals is now being built by the Wells Manufacturing Corporation, Three Rivers, Michigan. The advantage claimed for this type of machine is that, inasmuch as the saw consists of a band that is endless and passes through the stock in a straight line, the cutting action is continuous and the saw is engaging the maximum amount of stock possible at all times. The full length of the blade, or band, is used, and the blade cost is said to be low when the long life of the blade is considered.

Accuracy in cutting is said to be a feature of the Wells Band Saw. Lots of several hundred duplicate pieces have been cut with a variation of less than 0.005 inch. In many cases this accuracy permits the eliminating of facing operations.

The Wells saw is made in two sizes—4 in. and 8 in. The 4-in. saw has a capacity of 4 in. round, square, or angular stock, or 3 x 7½ in. stock. The motor

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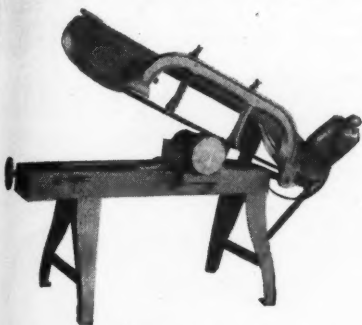
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May, 1934

is 1/8 h.p., constant speed, ball bearing driving. The 8-in. machine takes 8 in.



Wells Metal-Cutting Band Saw

round or square or 8 x 16 in. stock. The motor is 1/2 h.p., constant speed, ball bearing throughout. Six blades are furnished with each machine, one of which is in place in the machine.

### "Wearweld" Hard Surfacing Electrode

"Wearweld," a shielded arc electrode for building up steel surfaces to resist shock and abrasion, is announced by The Lincoln Electric Company, East 131st and Colt Road, Cleveland, Ohio.

Deposits made with this electrode are air hardening alloy steel with an unusual combination of hardness and toughness, according to the manufacturer. Wearweld can be used to build up all steels other than those of the austenitic type. It is said to be particularly valuable for facing parts subject to rolling or sliding abrasion, batter, sand abrasion or repeated impact.

The deposited metal has exceptional hardness, depending to some extent upon the composition of the base metal. A single layer on mild steel has a hardness of 40 to 45 Rockwell C. Additional layers will have a hardness of 48 to 52 Rockwell C, it is claimed. On .70 carbon steel, a single layer will have a hardness of 50 to 55 Rockwell C.

The heavy coating of this electrode provides a shielded arc, allowing the transfer of molten metal to take place under non-oxidizing conditions. It also provides a layer of slag which further protects the metal from the harmful effects of the air and causes the weld

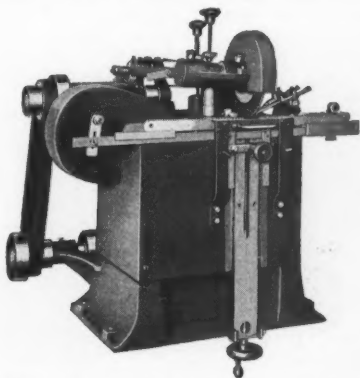
metal to solidify in a smooth uniform bead.

Good deposits may be made in very thin layers if required. If shaping is necessary, the deposit may be ground to size. Wearweld electrode is manufactured in two sizes: 1/4 and 3/16 inch diameter, both in 18-inch lengths. It is packed in 50-lb. steel containers.

### Wardwell Combination Automatic Saw Grinder

A fully automatic, bench or pedestal type, combination automatic saw grinder, is offered by The Wardwell Mfg. Company, 3167 Fulton Road, Cleveland, Ohio, for grinding all three classes of saws—circular, hack and band. The machine is designed to sharpen from 30 to 75 teeth per minute; double feed pawl fingers, one on each side of the grinding wheel, assure a continuous advance of the saw even where teeth are broken or filled with metal.

The grinding wheel spindle is mounted on ball bearings. The grinding wheel has two speeds, so that when the wheel has been used down to a smaller diameter, its speed may be stepped up accordingly. The spindle belt runs over a ball bearing idler and the belt tension load on spindle bearings is maintained uniformly by adjustable spring tension on



Wardwell Combination Automatic Saw Grinder

the idler arm. Freedom from vibration of the grinding wheel head and the elimination of slides are other features.

One universal cam permits of following any shape of tooth with the grinding wheel, whether straight or curved back. Through an adjustment in the eccentric,

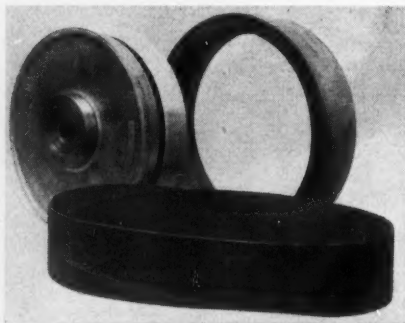
the proper speed may be quickly obtained for saws with large or small teeth. After regrounding, a land or flat may be put on each tooth to the amount required.

The grinder has a rigid one-piece cabinet frame, with removable front plate, and all parts and adjustments are accessible through a door at the side. The speed of the  $\frac{1}{2}$  h.p. driving motor is 1750 r.p.m. The grinding wheel is 8 in. diameter. The machine may be supplied in bench type as a combination grinder for circular, hack and band saws.

### Turkish Emery Polishing Sleeves

Endless abrasive polishing sleeves coated with genuine Turkish emery for use with its expanding polishing wheels were recently developed by the Cleveland Container Co., Abrasive Division, 10030 Berea Road, Cleveland, Ohio. The sleeves are made by the same process followed in fabricating the company's aluminum oxide "Nolap" abrasive sleeves. In this process a web of plain drills cloth and a web of abrasive coated cloth are fed through an automatic machine to form a double helix, one within the other, and overlapped so that the seams are staggered. The new sleeves are extra heavily coated on a specially prepared drills cloth backing.

The new emery sleeves are especially intended for use in producing the high

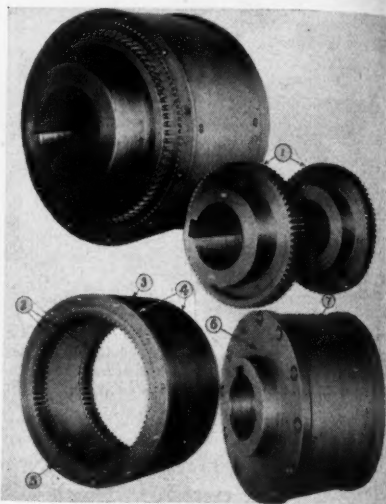


Turkish Emery Polishing Sleeves

luster wanted on aluminum, steel and other metals, either in the form of setup polishing wheels or abrasive sleeves. The emery sleeves bring out the desired luster. It is said that they can be used dry or with grease, oil, or emery cake.

### Waldron Torque Ring Coupling

John Waldron Corporation, New Brunswick, N. J., is now manufacturing an all-steel lubricated gear-type coupling



Waldron Torque Ring Coupling, Assembled and Disassembled

which, because of its unique design, is to be known as the Waldron Torque Ring Coupling. The coupling will be marketed through Smith & Serrell, 68-A Washington St., Newark, N. J.

Heavily loaded, bolted, or flanged connections have been eliminated in the design of this coupling, the construction being such that the torque is carried by lubricated surfaces through solid metal parts from hub to hub. The end plates, together with the center sleeve, form a dust and moisture proof enclosure containing a supply of oil that is said to be adequate for long periods of operation.

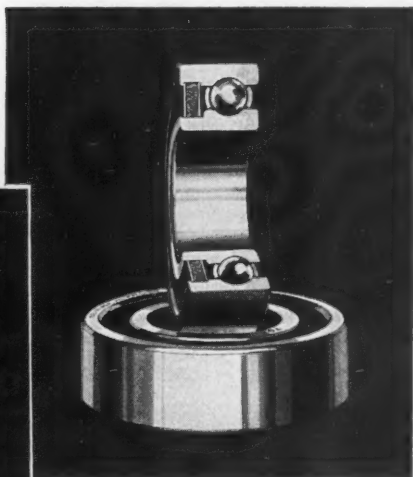
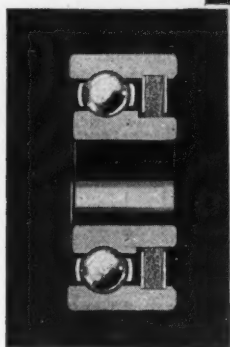
The hubs (1), which are of identical design, have toothed flanges at the center so that they can be turned end for end to obtain new driving surfaces, in case the original tooth surfaces become badly worn due to neglect of lubrication. The torque rings (2), from which the coupling derives its name, are two solid steel rings with teeth cut inside and outside. Thus is provided what is called quadruple engagement, there being four points at which relative movement be-



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Brun-  
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upling

# 8 POINTS of SUPERIORITY

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(1) Thick, closely fitting felts; (2) effective labyrinth formed by felt seal and plates against recessed inner ring; (3) seal removable in its entirety; (4) felt seal within confines of ring and not exposed to injury; (5) wide, solid inner and outer rings with maximum contact on shaft and housing, obviating the use of housing inserts and militating against slippage, looseness and escape of lubricant past outer ring; (6) outer ring can be clamped on both faces; (7) construction assuring dimensional exactness and quiet running; (8) grease capacity ample for long periods of service.

## "7000" SERIES



## BALL BEARINGS

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*Listing all sizes up to  
35 m/m bore, together  
with a complementary  
line of adjusting  
springs, felts and  
spring washers.*

**NORMA-HOFFMANN BEARINGS CORP., Stamford, Conn., U. S. A.**

tween the cooperating teeth can freely take place and thereby provide for misalignments or endwise displacement of the connected shafts.

The torque rings are loosely held in place within the cover sleeve (3) by screws (4) seated in the cover, and they together with the cover sleeve are handled as a single unit. By removing either end plate (6) the cover sleeve and torque rings can be moved in the opposite direction as required to line up or check alignment from the faces of the inner hubs.

It is claimed for these torque ring couplings that they are especially strong and durable even under heavy loads, and will withstand misalignment, shock, and vibration such as are often encountered on heavy duty direct-connected and geared drives.

Fifteen regular sizes are listed for shafts from  $1\frac{1}{4}$  in. to 12 in. diameter, with ratings from 22½ h.p. to 4,840 h.p. per 100 r.p.m., subject to only the occasional use of service factors on very high torque drives.

### Baldor "Flex-Align" Coupling

Electric motors, in order to operate quietly, are frequently mounted in rubber or cushioned to allow a slight vibration. Any unit that is driven direct by a motor so mounted must be flexibly coupled to it, and the coupling must be designed to afford certain necessary characteristics. To meet the requirements of such application, the Baldor Electric Company, 4359 Duncan Ave., St. Louis, Mo., has brought out the coupling shown in the illustration.

This coupling, to be known as the "Flex-Align" coupling, is said to have the following features: (1) it will allow lateral misalignment; (2) it will allow angular misalignment; (3) it delivers uniform angular velocity throughout a revolution; (4) it does not produce a thrust endwise between the shafts; (5) driving members are cushioned so as to absorb shocks and torsional vibrations; (6) it provides for close coupling; (7) it does not work loose; (8) it is quiet; (9) it does not cause side or bearing thrust, and (10) it is easy to install.

The manufacturers state that all parts are so fastened together that there are no loose parts to rattle. All parts are balanced; thus the coupling spins true and without binding the bearings. The motor may be coupled so close to the driven appliance that the shaft ends al-

most touch. Each part is held to the shaft with setscrews placed at 90 degrees,

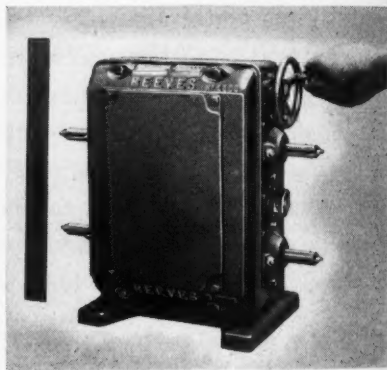


Baldor "Flex-Align" Coupling

giving a three-point support. It will run in either direction and without backlash.

### Reeves No. 0000 Vertical Enclosed Variable-Speed Transmission

A completely enclosed vertical design of variable speed transmission, less than 14 inches in overall height, has been announced by Reeves Pulley Co., Columbus,



Reeves No. 0000 Vertical Enclosed Variable-Speed Transmission

Ind. This is the No. 0000, illustrated herewith.

The unit is particularly recommended for upright installations of limited space and low h.p. requirements, and in which severe conditions of service may be encountered. The cast iron case completely protects the operating parts of the transmission from such destructive elements

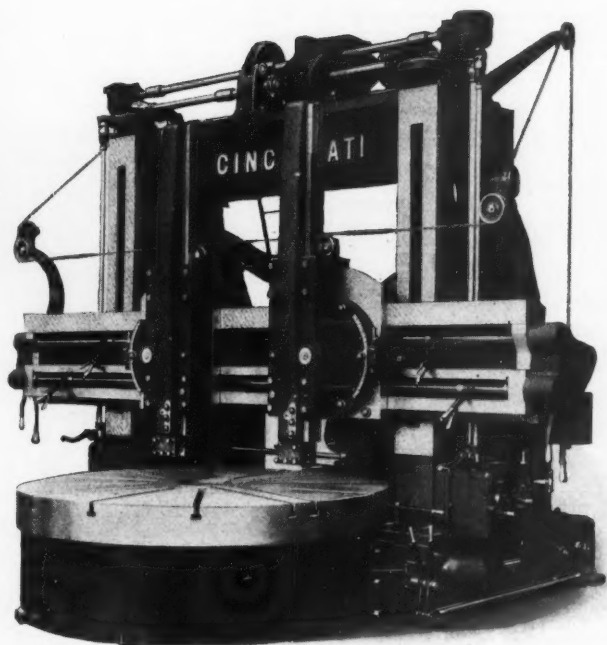
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Get the Facts on . . .

## The Cincinnati Boring Mill

ANY USER of the Cincinnati Boring Mill will tell you that it is a thoroughly modern tool. Incorporated in its design are modern features which improve your production and cut your costs. Some of these features are:

**Centralized Control**—All control levers are operated from one central position.

**Rapid Power Traverse**—Speeds up production without additional physical effort.

**Feed Gear Box Mechanism**—Is entirely independent for each head. There are eight feeds provided.

**All Gears and Racks are of Steel**—To insure long, dependable service and low maintenance costs.

Built in various sizes from 5 feet to 12 feet to meet all requirements.

WRITE FOR BULLETIN

## THE CINCINNATI PLANER COMPANY

3100 SOUTH STREET

CINCINNATI, OHIO

as water, chemical fumes, abrasives, and so on. A convenient system of "centralized" force-feed lubrication is a feature of the design of this unit.

Comparison with the hand of the operator and with the 15-inch ruler illustrates the extreme compactness of the design. Overall width, not including handwheel, 11¼ in.; thickness, including feet, 7½ in.; net weight, 70 lbs.

The transmission provides infinite speed adjustment in ranges of from 2:1 to 6:1. Capacity, ¼ to ¾ horse power.

### Schwalbe Oil Reclaimer

Lubricating oils of all kinds, either heavy or light, can be reclaimed by the use of the Schwalbe Oil Reclaimer shown in the illustration. The reclaimer is now being marketed through the Imperial Devices Company, 3065 Fifth Ave., Chicago, Ill.

The outstanding features of the oil reclaimer are its simplicity and economy of operation. There are no moving parts and nothing to get out of order, the oil being drawn through the reclaimer by gravitation alone. As it travels through, it passes through a filter and emerges as a clean oil with a viscosity comparable to that of the oil in its original state.

It is said that the filtering material used positively contains no chemicals such as sulphuric or other harmful acids; in fact, any acidity in the oil is removed



Schwalbe Oil Reclaimer

in the reclaiming process. The reclaimer has a capacity for reclaiming 2½ gal. per hr. of light oil or 1½ gal. per hr. of heavy oil. The re-refining cost, based on the cost of electricity at 3c per kilowatt hour, averages 4c per gallon.

## This Keyseater

**Reduces  
Costly  
Set-Up  
Time!**

**Does  
Good  
Work  
Quickly**

**Send  
For  
Circular**



**Davis Keyseater Co.**

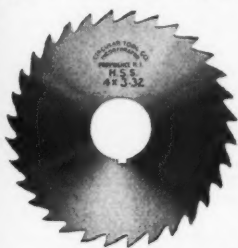
Exchange and Glasgow Sts.  
Rochester, N. Y.

### "Hold-Heat" Pyrometer

The application of heat has an important place in modern metal-manufacturing—so important, in fact, that no manufacturer of metal products in which heat is used can afford to be without instruments by which the correct temperatures of his furnaces, ovens, and so on can be ascertained.

The illustration shows a pyrometer that is now being marketed by the Russell Electric Company, 338 West Huron St., Chicago, Ill. The pyrometer is of the direct reading type with manual cold end adjustment, and is said to combine the features on simplicity and accuracy. The design of the "Hold-Heat" pyrometer eliminates connection leads and employs very heavy gauge thermocouples, which results in a total variable external resistance so low that its resistance is less than one part in 150 parts of the meter resistance. With the resulting large current flow, the pyrometer is able to employ a substantial rugged movement that will not easily get out

## The RIGHT SAW for CUTTING METAL



Years of experience in saw manufacturing PLUS modern, up-to-date manufacturing and hardening methods enables us to produce and recommend better saws for your problems. Circle "R" Saws are made in both high speed and carbon steel, from  $\frac{1}{4}$ " to 10" in diameter.

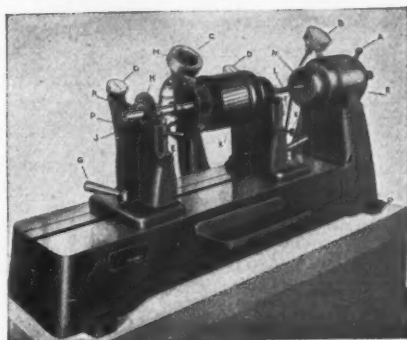
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**Circular Tool Co., Inc.**  
767 ALLENS AVE.  
PROVIDENCE, R. I.

## Eliminate VIBRATION

WITH THE

**New Globe Super-Sensitive  
Dynamic Balancing Machine**



**Static Balancers**

**Coil Winders**  
**Armature Winders**

**Wire Skinners**

**Cell Insulation  
Machinery**

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**THE GLOBE TOOL & ENG'R'G CO.**  
402 DAVIS AVENUE DAYTON, OHIO

## PERFECT BALANCE IS IMPORTANT

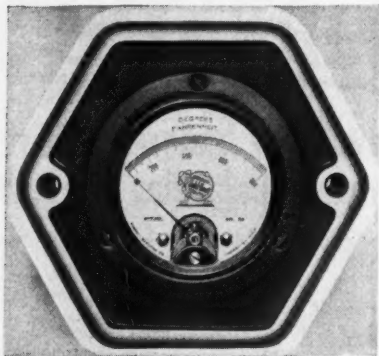
Today's buyers of equipment demand smooth operation. To insure it, such parts as clutches, flywheels, pulleys, fans, auto wheels, etc., must be balanced with precision. The Micro-Poise Precision Balancing machine detects unbalance to extreme accuracy and measures depth to drill to correct it. It's simple, accurate, fast, efficient.



Write for  
complete details  
today.

**Commerce Pattern  
Foundry & Machine Co.**  
2211 Grand River Ave., Detroit, Mich.

of order, together with substantial control springs that make the meter practically "dead-beat."



"Hold-Heat" Pyrometer

The different thermocouples used with the "Hold-Heat" portable pyrometer have nearly the same electrical resistances. Because of this fact, it is possible to calibrate the meter with an external resistance equal to the average resistance of the different thermocouples, thus reducing the maximum possible error due to external resistance to less than one part in 150.

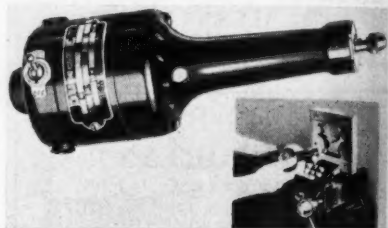
The Hold-Heat pyrometer is mounted permanently in a position that is not subject to the heat of the machine. No connection leads are employed, and the No. 6 gauge thermocouple extends direct from the meter to the point where temperatures are to be measured. The hexagonal aluminum case is so designed that the pyrometer extension leads may be attached to the top, bottom, or either side of the case as required.

## Dumore Model 8-HG Grinder

The Dumore Company, 28 Sixteenth St., Racine, Wis., announces a light weight high speed hand grinder for use in pattern shops, machine and engraving shops, and in tool rooms. The grinder will be known as the Model 8-HG. It weighs only 1 lb. 10 oz. and is so balanced that it can be held in the hand and used as one would use a pencil.

The grinder is powered by a 1/40 h.p. Dumore motor of the universal type which can be used on either A. C. or D. C. current. The motor has a speed of 15,000 r.p.m. and is excellently ventilated, making continuous use possible. The armature is dynamically balanced, which makes for smooth operation and long commutator, brush, and bearing life. The armature is mounted in precision ball bearings of the double grease-sealed type, assuring maximum bearing life and reducing friction drag to the minimum.

A special 3/4-in. capacity chuck, toggle switch, 8 feet of rubber-covered cord,



Dumore Model 8-HG Hand Grinder

plug, and three grinding wheels on shanks are regular equipment. Twelve different-shaped wheels in a special box can be supplied upon request.

IF YOU'RE INTERESTED  
IN ARC WELDING  
PROFITS



\$30  
MONTHLY  
30 DAYS  
TRIAL

Get this NEW Arc Welder Book  
FREE!

Tells how you can build profits for your shop with Electric Arc Welding Service and shows you how to make real money with "Simplified" Arc Welding. Extremely easy to operate with "Simplified" Remote Control. Attractively priced—easily pays for itself out of increased profits it brings. Just send this ad with your letterhead for a copy of this NEW Arc Welder Book—it's FREE for the asking.

HOBBART BROS.  
BOX ME-54

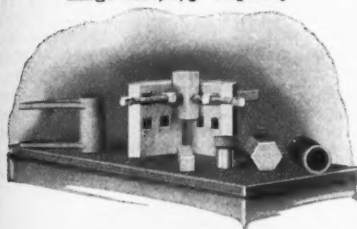
Troy, Ohio





## SQUAR-IT CLAMPING BLOCKS

Small Size,  $2\frac{1}{8}$ " Capacity  
Large Size,  $4\frac{1}{2}$ " Capacity



**HUNDREDS OF THESE NEW FIXTURES NOW IN  
USE THROUGHOUT THE UNITED STATES**

THIS block will hold various shapes and eliminate many special jigs. It can be used to advantage on the shaper, grinder, lathe, milling machine, engraving machine and for quick squaring and clamping, laying out work, etc.

Write for descriptive circular and prices

**NATIONAL TOOL & MACHINE CO.**

41 So. Water St., Rochester, N. Y.

## GRANT NOISELESS RIVET SPINNING MACHINE

The Pioneer of its type—built and constantly improved over a period of more than twenty-five years—produces highly polished heads, without hammer or tool marks, at a rate of a **RIVET A SECOND.**

Also built in Vertical and Horizontal Multiple Spindle types.

For work in hard to get at places we build Hammer type Machines.

Send us samples and be convinced of its superior qualities.

*Write for Literature — and don't forget to send that sample!*



**The Grant Mfg. & Machine Co.**

96 Silliman Ave.

Bridgeport, Conn.



MODEL  
8 H-G

**A New Dumore Light Weight**

**High Speed Hand Grinder**

Here is a new Grinder that will be welcomed by craftsmen in tool rooms, pattern, machine, and engraving shops when fine handgrinding is required. . . This new Grinder weighs only 1 lb. 10 ozs., is equipped with a  $\frac{1}{40}$  H. P. universal motor which has a speed of 15,000 R. P. M.;  $\frac{1}{8}$  inch capacity chuck, toggle switch, 8 feet of rubber covered cord, plug and set of three grinding wheels on shanks. . . The price is only \$17.50. Send for descriptive literature.

DUMORE COMPANY, 28 Sixteenth St., Racine, Wis.

**DUMORE**  
GRINDERS

**CAN BE USED LIKE A PENCIL, WEIGHS ONLY 1 LB. 10 OZS.**



This New  
Societe  
Genevoise  
Desk Type  
**Projector**

provides an easy and rapid and very exact means of inspecting the form and accuracy of small parts of all

kinds, including measurements on the surface of materials by Episcopic Illumination.

Magnifications of 10X, 20X, 50X and 100X guaranteed exact to 1/2000th. No shadow of operator's head, hands or implements. Measurement made directly on the image. Drawings and photos easily made.

Ask for Catalog 577.

**THE R. Y. FERNER CO.**

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**CHAMPION STEEL RACK**

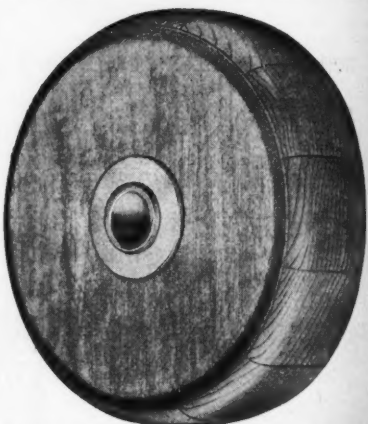
Write for Specifications and Prices

**WESTERN TOOL & MFG. CO.**

Springfield, Ohio

**Metzgar Light Duty End-Wood Truck Wheels**

Maintenance engineers and executives who have been using Metzgar End-Wood Protective Tread Wheels, made by The Metzgar Company, Inc., Grand Rapids, Mich., will be interested to know that this company has perfected a new wheel for light duty. Like other Metzgar End-Wood Wheels, each wheel is built up from a number of wedges, each cut from carefully selected hard northern maple. By a special water-proof gluing process, the wheel is constructed without the



Metzgar Light Duty End-Wood Truck Wheel equipped with ball bearings

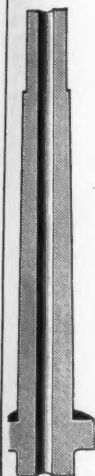
use of rivets or other metal. The tread is then turned and crowned into an exact circle of wear-resisting end-grain.

The wheel is made either with oilless end-wood bearings or with ball bearings, in diameter from 2½ in. to 10 in. inclusive. Any thickness of face, hub-length, or bore for axle will be supplied as standard.

**Armstrong Star Drill**

The illustration shows the design of a "Star" drill that is now being marketed by Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., for use in making holes in concrete, stone, brick, plaster, tile, and so on. The drill is drop forged from a special grade of steel and heat treated to give it the necessary toughness and stamina to withstand the

## Check Up... It Pays!

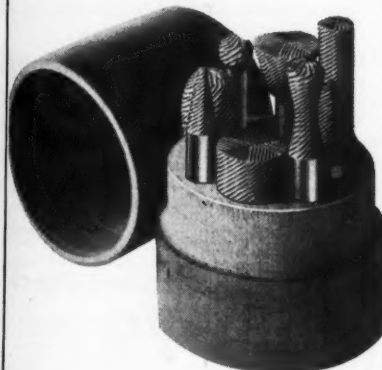


You can save money by using American Hollow Bored Products. In addition, the high quality of American hollow bored forgings, steel shaftings and hydraulic cylinders insures long, dependable service.

*Write for Complete Data and Prices*

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HOLLOW BORING CO.**  
2000 Raspberry St.  
Erie, Pennsylvania

## ROTARY FILES



**The Handiest Kit in the Crib**  
A small Investment which Pays large Dividends Daily.

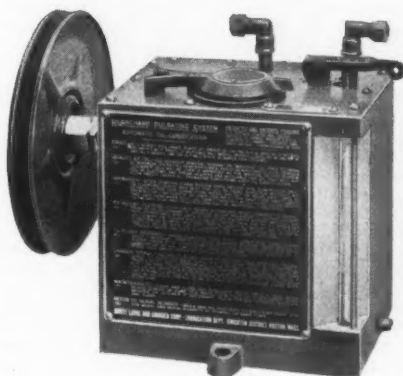
**M. A. FORD MFG. CO.**

108 Harrison

Davenport, Iowa

## BLANCHARD PULSOLATOR

**AUTOMATIC OIL LUBRICATION  
SYSTEM FOR  
INDUSTRIAL MACHINERY**



**PUMPING UNIT**

### AUTOMATIC

Starts And Stops With The Machine  
Feeds Bearings At Determined Intervals  
Individually Measures Oil For Each Bearing

### RELIABLE

Oil Feed Always Visible At The Bearings  
Flushing Lever Constantly Shows "All Is Well"  
Fresh Oil Regularly Applied To Bearings In Motion

### ECONOMICAL

One Pumping Unit Can Supply 100 Bearings  
Oil Measured As Low As One Drop An Hour  
Single Loop Circulating Line Requires Minimum Piping

*Write for Bulletin B-5.*

## RIVETT LATHE AND GRINDER CORP.

Faneuil, Brighton, Mass., U. S. A.

effects of the service for which it is intended.

The drill is made with four lips, or



Armstrong Star Drill

points, which design is said to afford a maximum life. It is available in lengths from 8 in. to 24 in., and in dimensions from  $\frac{1}{4}$  in. to  $1\frac{1}{2}$  inches.

### Brown Recording Thermometer and Pressure Gauge

An entirely new and improved line of 8-in. and 12-in. circular chart instruments has been placed on the market by The Brown Instrument Company, Philadelphia, Penna. These instruments include thermometers in indicating and recording types for temperatures from  $-40$  deg. F. up to  $1200$  deg. F., and indicating or recording pressure and vacuum gauges for ranges from 10 in. of water up to 5,000 lbs. All types are offered in one, two or three pen models.

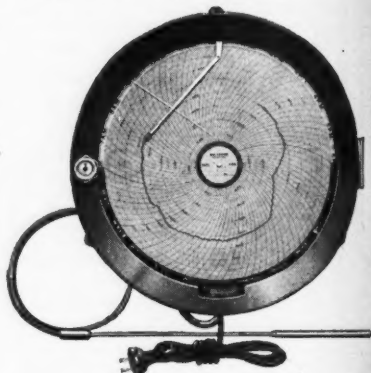
In developing this new thermometer line, much research was devoted to improving the helix mechanisms (Bourdon tubes). The mercury-filled helix is built of a special stainless steel which stands 100 per cent overload and provides a surplus of power to move the pen. The gas and vapor type helices are made of heat treated phosphor bronze which gives greatly increased ruggedness and power. These thermometers may be located at distances up to 200 feet.

In the pressure and vacuum gauges, three different types of actuating movements are employed. For ranges 10 in. of water to 30 lbs., a flexible metal diaphragm is used. For ranges 30 and 200

lbs., a spring-opposed bellows has been developed which gives a powerful pen action in this range. For pressure over 200 lbs., a helix is used.

An electric clock is standard at no extra cost for all models. Where A.C. current is not available, hand-wound clocks are furnished. Cases are of die cast non-corrosive aluminum and are interchangeable for back or bottom connection or for flush panel mounting, permitting unlimited flexibility in installation.

Other new features include:



Brown Recording Thermometer and Pressure Gauge

- (1) Handy toggle switch to start and stop electric clock;
- (2) Combination door handle and built-in lock;
- (3) Automatic chart clips carried on door hold chart in place;
- (4) No chart knob to lose. Chart is simply pressed on chart hub;
- (5) Automatic pen release of powerful

### Make Your Own Service Tools and Replacement Parts With ATLAS 9" LATHE...

Many machine shops, garages, etc., have paid for an Atlas screw-cutting lathe by making their own tools. Big savings on power also. Uses only  $\frac{1}{4}$  h.p. motor. Does all lathe jobs. CUTS 4 TO 72 THREADS PER INCH. Swing 9"; 18" between centers. ALSO LARGER SIZES. Compound rest, hollow spindle, automatic reversible feed. V-belt drive, 6 speeds. Self-contained countershaft. Built-on motor bracket and switch. Easy terms. Money back guarantee. Full line of attachments. Ask your dealer or write us.



**ATLAS PRESS CO.**

1846 N. Pitcher St., Kalamazoo, Mich.



**\$79**

Complete as shown Less Motor

ON EASY TERMS

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If you the enabling the right addition is also you t

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## What's Your Answer?

If you use bushings, you'll want a copy of the New Buckeye Stock List "G". It is enabling many manufacturers to quickly select the right bushings for specific requirements. In addition, the New Electric Motor Bearing List is also proving very helpful. Shall we send you these folders. No obligation.

### Buckeye Brass & Mfg. Co.

6410 Hawthorne Ave., Cleveland, Ohio

#### Warehouse Distributors

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ATLAS BRASS FOUNDRY CO.  
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562 W. 52nd St. New York, N. Y.

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## MENDES QUALITY DIAMONDS *Always Sharp*



REDUCE  
GRINDING  
COSTS



FOLDER  
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ON REQUEST

### Mendes Cutting Factories, Inc.

DIAMONDS AND DIAMOND TOOLS  
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Rep.: Milwaukee, Indianapolis, Cincinnati,  
Pittsburgh, Baltimore

## THIS IS SCREWDRIVING!

■ The rapid, never failing, mechanism that feeds the screws, the instantaneous contact of the high speed rotating bit which finds the slot, drives the screw perfectly, leaves it unmarred, and is ready for the next; *this is screwdriving!* You get it in the DETROIT POWER SCREWDRIVER.

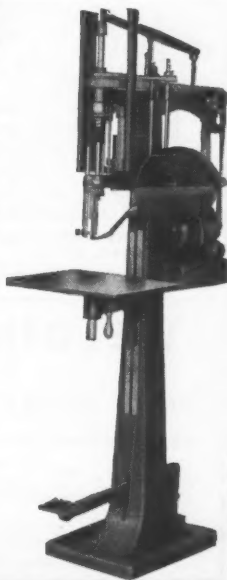
■ Where there are many screws to drive; auto parts, refrigerators, electric and household appliances, especially; the DETROIT POWER SCREWDRIVER will save time and cost. Tell us what you want to drive, or send samples; we will furnish information on speeds, production, and fixtures.

*Our bulletin on power screwdrivers will interest you.  
Write for your copy.*

### DETROIT POWER SCREWDRIVER CO.

5369 ROHNS AVENUE, DETROIT, MICHIGAN

LONDON, ENGLAND OFFICE  
VINCENT HOUSE, VINCENT SQ.



construction lifts pen from chart when door is opened;

- (6) Greatly increased torque eliminates pen friction;
- (7) Convenient micrometer thumb screw permits easy recalibration, if range of the instrument is to be changed after installation;
- (8) Felt gasket and cemented glass in door makes case dust and moisture-proof;
- (9) Zero adjuster is rugged and accessible;
- (10) Black Duco enamel finish standard; many other colors or types of finishes also available.

A great variety of sizes and shapes of bulbs are available. Also, a wide choice of standard charts is offered. This stock of standard ranges has been built up throughout the many years during which Brown Thermometers have been applied to industry, and include unusual ranges for special service in different industries.

### "Rawlplug" Screw and Bolt Gage

To allow for the quick and accurate selection of the proper Rawlplug for any given wood screw or lag screw, The Rawl-

plug Company, Inc., 98 Lafayette St., New York, N. Y., has developed a gage which, upon the insertion of a wood or lag screw between the jaws or slots, will instantly show what size Rawlplug should be used, and vice versa.

The gage is made of heavy polished, anti-corrosive steel, and is 6 in. long by 1½ in. wide, which allows it to fit easily into a pocket or kit.

One face of the gage shows all standard wood and lag screw sizes and gives the corresponding sizes of Rawlplugs to be used with each. The other side shows all standard Rawlplug sizes and corresponding screw sizes to be used with each. It is also calibrated in fractions of an inch to determine bolt sizes for ¼ in. to ¾ in., one can be used as a caliper on corresponding sizes of round bars.

One edge of the gage forms a 6-in. rule, graduated by sixteenths of inches, and the other forms a 5-in. rule with a slot which permits the accurate measurement of countersunk wood screws.

The scale price of the gage is said to be fifty cents, but any mechanical executive who will address his request on his firm letterhead and send it to MODERN MACHINE SHOP, 128 Opera Place, Cincinnati, Ohio, together with ten cents in stamps to cover mailing charges, will receive one free.



Rawlplug Screw and Bolt Gage.



**THOUSANDS  
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Let us end YOUR grinding, lapping... in fact all your coolant troubles with

**GUARANTEED  
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PUMPS**

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536 E. Front St. Cincinnati, Ohio



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½ to 100 K. V. A.

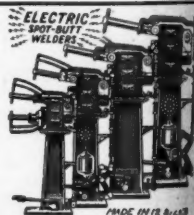
FOOT OPERATED — MOTOR DRIVEN

For Welding Metals Having a Combined Thickness  
From .001 in. to .500 in.

WELDERS AS LOW AS \$35.00

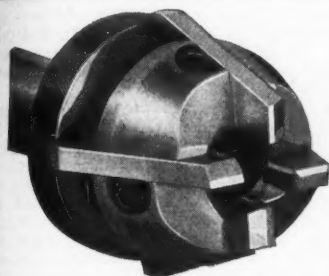
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*Are Cutting Costs Everywhere*

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## L.R FLEXIBLE COUPLINGS

**LOWER MAINTENANCE COSTS**

**BALANCED · COMPACT · QUIET**



Canadian Pat. 303133

U. S. Pat. 1748146. Other Patents Pending.

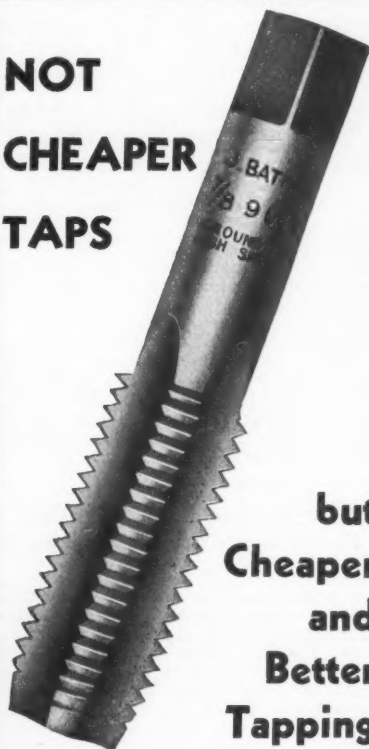
Thousands used by manufacturers of Refrigerating Machinery . . . Blowers . . . Pumps . . . Air Compressors . . . Coal Handling Machinery . . . Stokers . . . Oil Burners . . . Sewage Ejectors . . . Household Appliances . . . Unit Heaters . . . and many other electrical driven devices. Steady repeat orders prove their economy and worth. Stocked in all sizes for loads up to 350 hp. at 100 R.P.M.

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**but Cheaper and Better Tapping**

Recently we found a manufacturer securing from 200 to 300 holes per grind, and about 2500 holes per life of tap, and satisfied.

A BATH engineer was able to induce this manufacturer to try BATH taps, and the result was more than 40 times as much production from a BATH tap which cost only twice as much as the tap previously used.

The BATH tap cuts cleaner threads, and has not yet worn out. Perhaps we may do the same for you.

## John Bath & Co., Inc.

Taps — Chasers — Gages  
WORCESTER, MASS.

## Bonney Adds Line of Screw Drivers

Bonney Forge and Tool Works, Allentown, Pa., has placed on the market a line of screw drivers with one-piece,



Bonney Screw Driver

heat-treated blades. The blades are ground and polished and the tips are taper ground to insure a non-slip fit in screw slots.

The handles of the screw drivers are of a tough, transparent composition, amber in color, and a non-conductor of electricity. The handles are said to be virtually unbreakable, and are fluted to provide a comfortable grip. Five styles are available in a total of 13 sizes, from 3 in. to 12 in. in length.

## New Process Increases Film Strength Of Mineral Oil 40 Per Cent to 65 Per Cent

An interesting new series of industrial lubricants which have unusually high film strength due to a special polymerization treatment has been announced by Research Staff of E. F. Houghton & Co., 244 W. Somerset St., Philadelphia, Pa.

These new products, known as Sta-Put Lubricants, are made of pure mineral oil which is polymerized under carefully controlled heat and pressure. This treatment results in a complete re-arrangement of the molecules of the oil without any change in its chemical content, thus producing a much closer bond between all of these molecules and a consequent increase in film strength.

Actual tests on scientific testing

machines indicate that this treatment increases the film strength of these oils 40 per cent to 65 per cent. In addition, they cling to the bearing surfaces and do not drip or spatter as easily as ordinary mineral oils.

Sta-Put Lubricants are made in three series and are available in grades for nearly every type of industrial equipment. The "300" series are liquid, ranging in consistency from light machine oils for high speed spindles to heavy oils for slow moving bearings and extremely high loads. The "400" series are made especially for gear lubrication. Several grades have been developed for all types of gears to meet any condition of speed and load. The "500" series are of grease consistency and are made for screw-down grease cups, automatic grease lubrication systems, and so on. They feed freely through any system, and they will not separate, harden or turn rancid.

## "Rust-I-Cide"

A liquid chemical preparation that is said to dissolve rust within a few minutes after application has been placed on the market by The Rusticide Products Co., 1947 East 19th St., Cleveland,

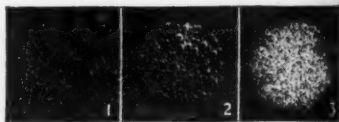
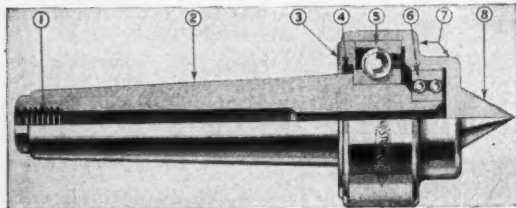


Fig. 1—Microphotograph of a spot of rust-covered metal. Fig. 2—The same spot after a drop of "Rust-I-Cide" has been applied. Note the bubbles as the rust is dissolved. Fig. 3—After ten minutes the rust has entirely disappeared.

Ohio. When applied to rust spots on metal surfaces the chemical action is immediate, bubbles forming as the rust

## A THIRTY DAY FREE TRIAL



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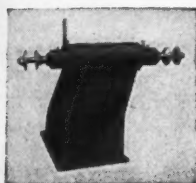
Try a Sturdimatic live center in your own plant absolutely free for 30 days. If you can afford to be without it return it and your obligation ceases.

Write for Catalog No. 433

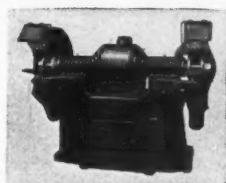
5222 Third St., Detroit, Mich.

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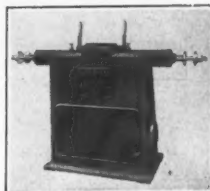
Bearings and the Motor are subject to the most wear on a Grinder and Polisher—We give these units extra attention by **SPECIAL BEARING HOUSINGS** and the **MOTOR AIR CLEANER**.



**Rite Speed Polishers.**  
Made in 4 types each  
in sizes 3 to 20 HP.



**Heavy Duty 4 bearing Snag-**  
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**and Rubber bonded High**  
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**Two Motored Rite speed**  
**Polishing and Buffing**  
**lathes. Two spindles with**  
**independent spindle con-**  
**trol.**

# **FOSDICK ECONOMAX RADIAL**



Here's what you want in a Radial . . . up-to-the-minute simplicity, compactness, accessibility, ease of operation. You get these advantages in the FOSDICK ECONOMAX, the radial that sets real new standards of efficiency and economy on large and small holes. Remarkable range and selectivity of speeds and feeds—36 spindle speeds, 18 feeds. Sizes 3' to 8'.

Write for details on this machine and also the new FOSDICK High Speed Ball Bearing Sensitive Drills.

**THE FOSDICK**  
**Machine Tool Co.**  
CINCINNATI, OHIO

passes into solution with the liquid. The product is known as "Rust-I-Cide."

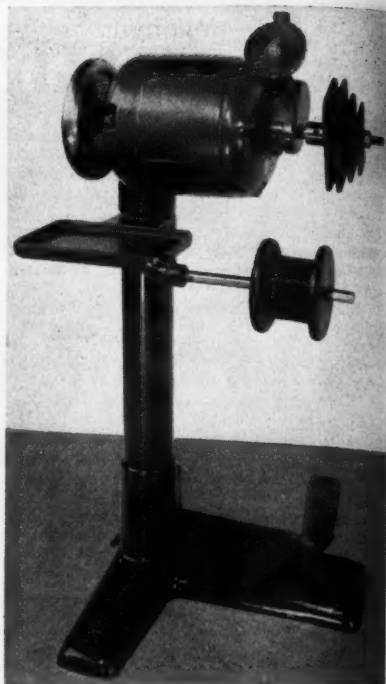
The illustration shows three microphotographs that were made by the research engineers of the Brush Laboratories of Cleveland, during a test. Figure 1 shows a section of metal covered by the virgin rust. In Fig. 2 the same spot is shown a few seconds after a drop of "Rust-I-Cide" has been applied. Note the bubbles that are being formed as the rust is dissolved. In Fig. 3 the same spot is shown after the "Rust-I-Cide" has been at work ten minutes. Note that the spot is clean, all rust having disappeared.

A rust-eliminating agent that will work as quickly and as efficiently as "Rust-I-Cide" should be of considerable value in a metal-working plant in preventing the depreciation of both tools and product.

### Globe Coil Winder

A coil winding machine especially designed to wind various types of coils for electric motors, magnets, or radio parts, has been announced by the Globe Tool & Engineering Co., 402 Davis Ave., Dayton, Ohio.

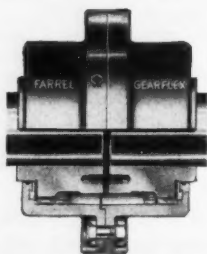
The machine is controlled entirely by the operator's foot, in contact with the foot pedal at the base of the machine.



Globe Coil Winder

Depressing the pedal slightly starts the machine at slow speed. Further depressing of the pedal increases the speed of the machine to a maximum of 4,000 r. p. m. As soon as the required number of turns have been made, the operator removes his foot from the pedal, which action automatically cuts off the current and applies a brake to stop the machine.

### OIL FILM Carries the Load



In the Farrel Gearflex Coupling the load-carrying surfaces are the teeth of the external and internal gears protected by an oil film which provides a cushioning effect, giving silent operation, trouble-free service and long life.

Other advantageous features are described in Bulletin No. 437. Send for your copy today.

**FARREL-BIRMINGHAM**  
COMPANY, INC.

381 Vulcan Street, Buffalo, N. Y.

### CENTERLESS GRINDING

Accuracy — Prompt Service

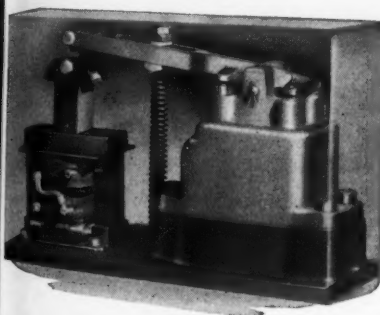
**COMMERCIAL CENTERLESS  
GRINDING CO.**

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# ROSS Operating VALVES

"The Bridle for Air Horsepower"

**Reduce Air Costs  
with the  
Improved Solenoid  
Control Valve**



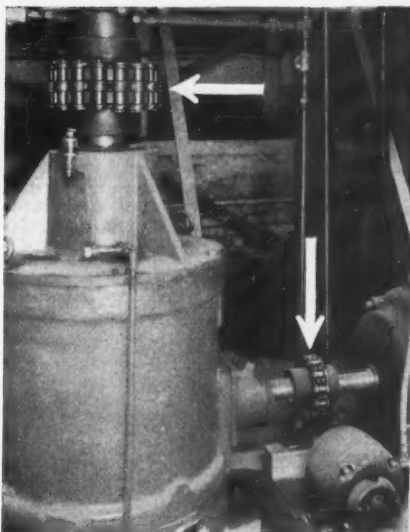
Just push a button to control the improved Ross Solenoid Valve. You save time — it requires no effort — and it's more economical — no extra piping — less air waste.

Unit is of compact, rugged construction. Used either with A. C. or D. C. on all Ross Valves. Adaptable for single or double acting cylinder with pipe sizes from  $\frac{3}{8}$ " to  $1\frac{1}{4}$ ".

*Write for Catalog illustrating  
Ross Operating Valves*

**ROSS OPERATING VALVE CO.**

6488 EPWORTH BLVD.  
DETROIT MICHIGAN



## COUPLINGS . . . Easy to Install . . . Easy to Disconnect

Diamond Flexible Couplings are extremely simple—two sprockets and a length of Diamond Chain. Connected or disconnected in a moment. Flexible yet made of steel for long life. They take little space along the shaft.

The illustration shows two Diamond Couplings—one between motor and speed reducer and the other on the vertical shaft of reducer to mash tub on floor above which revolves at the rate of 12 r.p.m.—a load with impulsive start.

**WRITE  
FOR  
CATALOG**

All the details of Diamond Flexible Couplings are described and illustrated in our Catalog No. 11—copy free on request.

**DIAMOND CHAIN & MFG. CO.**  
459 Kentucky Ave., Indianapolis, Ind.  
Offices and Distributors in All Principal Cities.

**DIAMOND  
FLEXIBLE  
COUPLINGS**

A counter of special Globe design and manufacture provides visible check on the number of turns applied to the coil being wound. This counter will not repeat even at high speeds, and an accurate count is assured at all times. The counter is set to zero by a simple movement of one knob through one revolution of the counter dial.

Winding forms of any design can be mounted on the motor shaft extension by loosening a single screw. The machine can be provided with a special tailstock which can be swung out of the way. This tailstock is used for two-pole armature winding of small series wound armatures and will wind armatures of two-pole style up to one horse power.

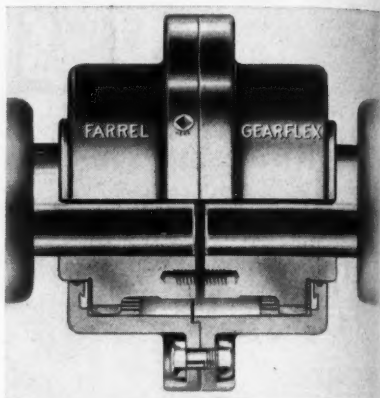
The machine is ideally adapted for winding banks of insertion coils for armatures or fields where basket or lap winding is used.

### Farrel "Gearflex" Coupling

A flexible coupling of the gear type, known as the Farrel "Gearflex" Coupling, has been introduced by the Farrel-Birmingham Company, Inc., 344 Vulcan St., Buffalo, N. Y.

The double engagement type illustrated consists essentially of two externally-gearred hubs keyed to the two shafts to

be connected and engaging an internally-gearred floating sleeve which encases the two hubs. With two sets of spur gear—



Farrel "Gearflex" Coupling

one at each end of the floating sleeve—misalignment is compensated for by the sleeve assuming a neutral position between the two shafts. Thus all whip or crank action is eliminated, relieving bearings and shafts of heavy pressures or vibration. The use of accurately-generated external and internal spur gears, cut on the Sykes gear generating machine, insures precision and distribution of the load over a large number of contact surfaces.

The large reservoir between the hubs and the floating sleeve carries the supply of lubricant. When the coupling rotates, centrifugal force throws the oil to the inner surface of the floating sleeve where it spreads between the gear teeth, entirely immersing the load-carrying surfaces in a bath of oil. The load is car-

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For lapping, finishing, polishing a wide variety of small parts. Totally enclosed  $\frac{1}{2}$ -h.p. two-speed motor, 900-1800 or 1700-3400 r.p.m. Automatic brake, quick acting collet chuck to take up to 1" stock. Also other types with universal chucks, hole throughout spindle, etc.

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Mfgs. of Electric Tools Since 1907



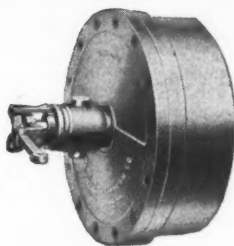


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**Do not require . . .**  
an operating valve with 3  
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**Valve is a part of  
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and requires only a rod con-  
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position for operator.



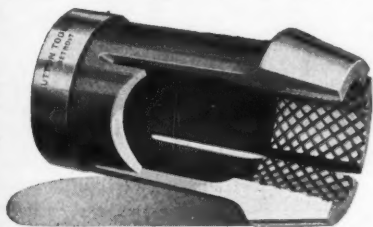
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**TOMKINS-JOHNSON CO.**

620 N. MECHANIC ST., JACKSON, MICHIGAN

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*with Diamond Serrations*



Diamond Serrations are an exclusive  
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ARE PROVING on a wide variety  
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Grips like a Diamond." You can  
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tighter with less chucking strain  
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slippage.

Catalog No. 11 gives full specifications of standard Round  
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**SUTTON TOOL COMPANY**

2842 W. Grand Blvd., Detroit, Mich.

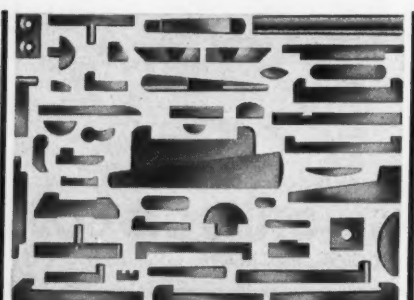
Representatives in all principal cities

**Always  
Specify**



ried by the oil film with no metal-to-metal contact between the teeth, thus providing a cushioning effect which gives a high degree of quietness in operation and reduces wear to a minimum.

The Gearflex Coupling is also made in a single engagement type which has only one externally-gearred hub in engagement with an internal gear in the sleeve, the other hub being solid and the sleeve bolted to it. The single engagement type is designed to provide a lower cost coupling for applications where the high speed capacity and the extreme flexibility of the double engagement type are not required.



### Morton Finished Machine Keys and Special Shapes

Accuracy maintained in processing the Morton way eliminates costly filing and fitting in assembly, assuring superior quality at no additional cost. Morton Special Shapes will best serve you. Bulletin 15B. Morton Patented Hi-Pro Keys are far superior to common type woodruff Keys. Large industrial concerns are fast adopting Morton Hi-Pros as standard. They are interchangeable with woodruff keys. Bulletin 25B.

**Morton Manufacturing Co.**

Muskegon Heights, Michigan

Both types are available in a number of standard sizes and power ratings.

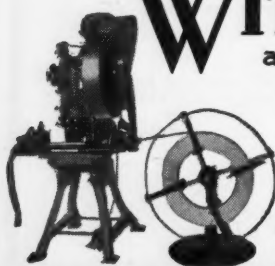
### Hedglon Automatic Electric Oil and Coolant System

An automatic electric system for supplying coolant to machine tools or oil to reservoirs of machines of various types



Fig. 1—Hedglon Pump Unit with automatic pressure switch.

and kinds, has been developed by the Diefendorf Gear Corporation, 918 W. Belden Ave., Syracuse, N. Y. The system is based on the use of a Hedglon gear type of pump which can be equipped, as shown in Fig. 1, with a pressure dome and an automatic pressure switch. The dome insures a constant pressure on the fluid; thus the switch automatically



## WITTEK AUTOMATIC ROLL FEEDS

and Reel Stands for Punch Presses

**Fast      Accurate      Automatic**

Wittek Feeds are designed for high-speed feeding of any stock from coils. Can be mounted on the right, left, front or back or in tandem as a push-pull feed. Will feed from 0" to 30" or more per stroke of the press. Built with or without straighteners to meet all feeding conditions.

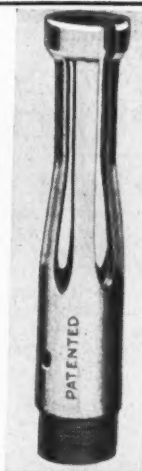
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## "Modern"

...the feed finger which is used in practically every modern screw machine shop in the country. It can be adjusted with a slight tap at the top of each rib. The same feeder can be used either for hex or round or hex or square.

Write for New Catalog No. 31, giving facts on our products.



**MODERN COLLET & MACHINE CO.**  
401 SALLIOTTE ST. ECORSE, MICH.

Mfgs. of all types collets, feed fingers, alloy steel cams, chucking fingers, collet and pusher tubes and various perishable parts for screw machines.

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New  
**HANDBOOK**

of

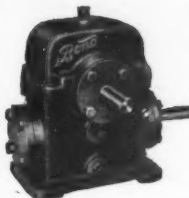
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Above. Osgood's New Patented Super Strong Heavy Duty Safety Indestructible Handle.

At Right. Osgood's Patented Safety 'File Grip'.

Every shop needs these items. The New Super Strong handle is steel lined, double the strength and endurance of any previous model. Surface is smooth, of highest grade wood, shaped for balanced hand grip. The Safety File Grip, slipped on the outer end of file, prevents hand cuts, soreness, and hand fatigue.

Send a dime. This valuable handle or file grip will be mailed to you at once for proving in your shop. Descriptive price list for the asking.

**J. L. OSGOOD MACHINERY & TOOL CO., INC.**  
43 Pearl Street Buffalo, N. Y.

starts the motor when the pressure has been reduced through the use of the oil or coolant.

A pump unit without the pressure dome, shown in Fig. 2, is also made for

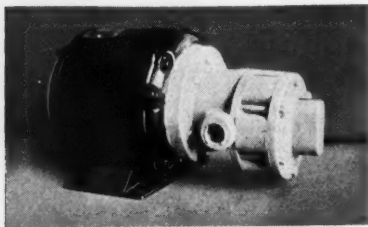


Fig. 2—Hedglon pump without pressure dome, for use with small machine tools.

use on small machines, the unit with the pressure dome being intended for use on large machines or where a battery of machines is supplied from a central tank. Both pump units are equipped with a  $\frac{1}{2}$ -h.p. motor and have capacity for delivering 250 gallons of coolant or oil per hour.

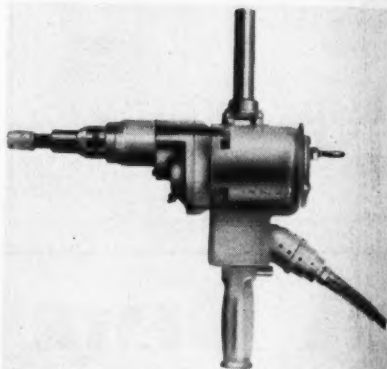
The only revolving parts in the pump are two bronze helical gears, one of which

is keyed direct to the extended motor shaft. The pump body is bolted to the motor frame. A patented mechanical seal eliminates the need for non-metallic packing or stuffing boxes.

### Buckeye "Shockless" Nut Runner

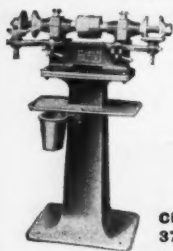
A "Shockless" high frequency electric nut runner, built with an adjustable releasing clutch which tightens the nut without shock to the operator, is being introduced by the Buckeye Portable Tool Co., Dayton, Ohio. The clutch, which is the feature of the tool, operates on a principle which is said to be new. It is not a friction or jaw clutch, but has an adjustable releasing cam which trips open the clutch when the nut is tight.

The tool is made in a number of sizes,



No. 30-N Buckeye "Shockless" Electric Nut Runner

the No. 30-N being shown in the illustration. The specifications for the tool shown are: motor, 3 phase, 180 cycles,



### St. Louis Grinders

Maximum service with low maintenance and smooth operation make St. Louis Grinders a most profitable tool. In use in hundreds of shops. Head available in either plain or anti-friction bearings. Built in six sizes.

Write for circular and prices.

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Counterbores and Countersinks, Counterbore Sets, Spotfacers, Core-drills, Reamers, Hollow Mills, Full Floating Holders, Facing Heads, Form Cutters, Boring Bars, Boring Heads, Adjustable Extension Holders, Multi Diameter Tools.

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32 SIZES  
SOLID BARS

### 600 Sizes of

General Purpose, Phosphor Bronze Bushings . . . ready for machine assembly. Graphited, Self-Lubricating Bronze Bushings . . . Write for Bulletin 339-A.

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COMPLETELY MACHINED, OD, ID, and Ends—No more under surface defects, ID always concentric with OD. 25% less weight. Cast in the most widely accepted General Purpose Bearing Alloy.

Available thru your Mill Supply Distributors

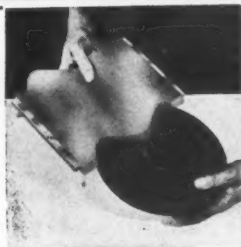
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or Contour  
Quickly,  
Accurately**



The Stockton Profile Gauge is the only adjustable conforming gauge on the market. It is a valuable time saver for die-makers, pattern makers, designers, inspectors, machinists and many others who have use for a temporary or permanent template. Adjustable to any curve, contour or angle. Available in a variety of styles and sizes.

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Please send bulletin describing the Stockton Profile Gauge.

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## STOCKTON PROFILE GAUGE CORP.

184 JACKSON STREET

LOWELL, MASSACHUSETTS

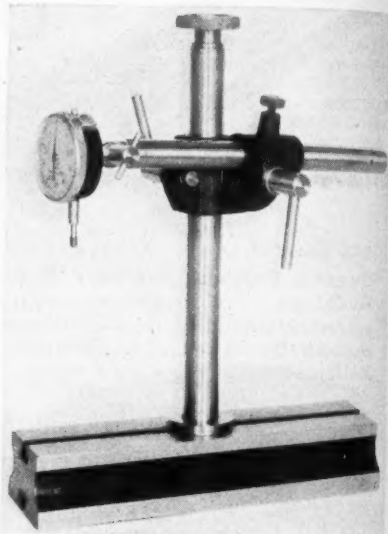
225 volts. Speed, 750 r. p. m. Capacity, 5/16 in. standard and light 3/8-in. nuts. Length, 14 in. Weight, 16½ pounds.

### New Dial Test Indicators Nos. 731 and 731-A

The Brown & Sharpe Mfg. Co. of Providence, has recently added to its line of dial test indicators two new indicators Nos. 731 and 731-A, illustrated herewith.

Exceptional rigidity, which insures great accuracy in the dial reading, has been obtained by using an upright and dial-holding rod of a much larger diameter

than is ordinarily used. Convenience has not been sacrificed, however, and these members are made tubular for lightness



B & S Dial Test Indicator No. 731-A

and handiness in use. This construction insures an exceptionally fine dial test indicator for more accurate and reliable inspection and set-up work.

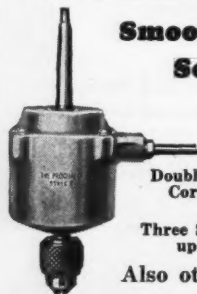
The clamps for making adjustments have also been improved and are of the lever type. They are easy to use and secure settings can be made more easily. The base of both indicators is of proportions ample for rigidity, with handiness considered, being 10 in. in length and 3 in. in width. The No. 731 Dial

## PROCUNIER

High Speed, Ball Bearing

### TAPPING ATTACHMENTS

Tap Perfect Holes at Speeds up to 3000 R.P.M.—Reverse at 6000.



**Smoother, More  
Sensitive**

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Double-Cone, Long Life,  
Cork Faced, Friction  
Clutch.

Three Sizes with Capacities  
up to ½" in Steel.

Also other Styles and  
Sizes

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## More Work - Lower Costs

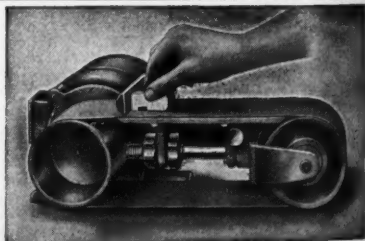
**SPEEDS PRODUCTION**

**SANDING — SURFACING —**

**POLISHING — BURRING**

**PRODUCTION No. 601**

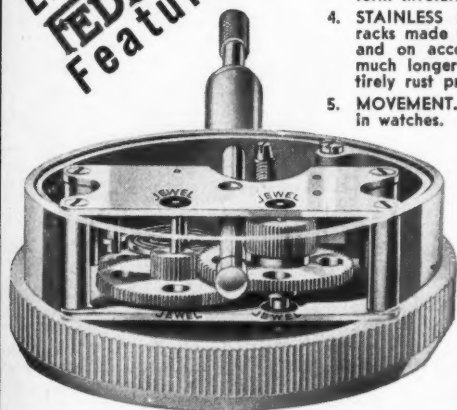
For Cleaning and Finishing Castings, Dies Stampings and Any Work that can be Ground. Gives a Straight Line Finish—Leaves Sharp Edges—Eliminates Hand Labor. Plugs into Lighting Socket—Ready for Instant Use. Low Price. Send for Illustrated Folder today.



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1. **JEWEL BEARINGS.** The same as used in the better grade watches. (Plain bearings optional.)
2. **DIE CAST CASE.** Stem cast integral eliminating all soldered joints. Die Castings, are of bronze-alloy composition.
3. **GEARS AND PINIONS HOBBED.** By our own special machines producing a much more accurate and uniform involute tooth form.
4. **STAINLESS STEEL.** All gears, pinions, screws and racks made from this material which is non-corrosive and on account of its extreme toughness will wear much longer than brass. Federal indicators are entirely rust proof throughout.
5. **MOVEMENT.** Made in an individual unit same as in watches. This reduces the time required for cleaning over the ordinary indicator construction more than one-half and makes it shock proof.
6. **CHROMIUM PLATE.** All exposed parts chromium plated.

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**FEDERAL PRODUCTS CORP.**

1144 EDDY ST., PROVIDENCE, R. I.

Branches:

DETROIT CHICAGO  
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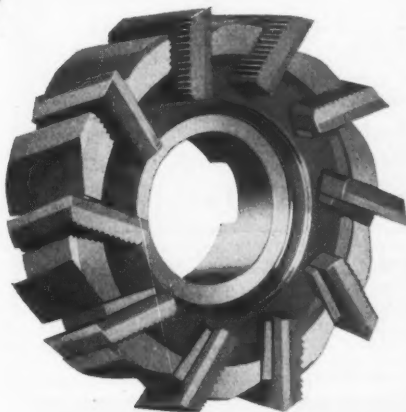
## Can Tools Talk?

YES and far more eloquently than any salesman---they alone can answer the question **Which Is Best?** For Simplicity, Economy and Ease of Maintenance

CONSIDER

## SERRATED BLADE CUTTERS

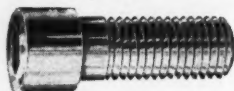
As Designed by **GODDARD & GODDARD CO., Inc.** DETROIT, MICHIGAN



Test Indicator is furnished with a dial graduated to .001 in. with a spindle movement of .300 in. The No. 731-A is recommended for work where a higher degree of accuracy is required; it is furnished with a dial graduated to .0001 in. and has jeweled bearings, the movement of the spindle being .020 in.

Straight and angular stops adapting the indicator for use on lathe bed, machine table, etc. are furnished as extras. The novel construction of these indicators and their striking features may be observed from the illustration. Each is furnished packed in a metal box.

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SAFE  
SURE  
STRONG  
SLIGHTLY  
SAVING

Socket Head Cap Screws

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Vest-pocket size

Small as a watch

Measures 1/1000-inch • Rustless

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Please send THICKNESS MEASURE  
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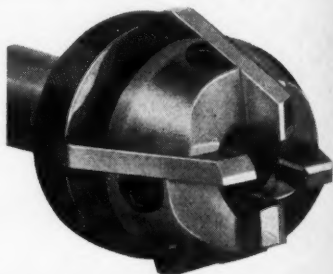
ADDRESS \_\_\_\_\_

**MONEY BACK IF NOT SATISFIED!**

**B. C. AMES COMPANY**  
WALTHAM, MASS.

## Genesee Adjustable Hollow Mill

The illustration shows the Style "M" Light-Duty Hollow Mill which has been placed on the market by the Genesee Manufacturing Co., Inc., 141 N. Water



Genesee Style M Adjustable Hollow Mill

St., Rochester, N. Y. The Style M and Style L mills are similar in design, the difference being that the Style M mill is made with the blades set at a cutting angle of 12 deg. for working steel while the Style L mill has the blades set radial for working brass, cast iron, and non-ferrous metals. Otherwise they are identical.

The body of the tool is of heat treated chrome nickel steel, and the shank is furnished to the user's specifications. The tool has four blades which can be of carbon steel, high speed steel, or tungsten carbide as specified. The blades can be adjusted  $\frac{1}{8}$  inch without resetting, and all blades have a minimum of  $\frac{3}{4}$  in. of blade life. Each blade is held in position by lock-screws, a half-turn of which releases the blade for adjustment. Blades can be removed for sharpening and replaced within 0.001 inch. Blades are interchangeable, and worn-out blades can be replaced at a nominal cost, thus reducing tool costs.



**MAGNOLIA  
BRONZE  
BAR STOCK**  
Semi-finished  
Inside and Outside

Cored and solid. Cleaned up ends. Stock sizes, 12", 13", 14" S.A.E. No. 64. Write for folder. Buy from dealer.

**MAGNOLIA METAL COMPANY**  
ELIZABETH, N. J.

By makers of Magnolia Anti-Friction Metal and Adamant Super-Genuine Babbitt

Mill  
e "M"  
s been  
ese  
Water

**THE MIDGET "FIVE-IN-ONE" SLIDE RULE**  
is a combination Mannheim, Polymetric Log-  
Log, Binary, Add and Subtract Slide Rule. It  
will instantly add, subtract, multiply and divide  
any combination of whole numbers, fractions,  
mixed numbers and decimals. Gives every root  
and power, also Logs, Sines  
and Tangents. Made of alu-  
minum with scales on white  
celluloid enamel. Size 4 in.  
Approved and adopted by  
colleges. Price with instruc-  
tions and Fabrikoid Case  
\$2.00. With leather case  
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sired. Catalogue Free



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TRADEMARK

(PATENTED)

## Safety Friction Chucks



Standard Bottom



Quick Change

## SAVE THEIR COST in Tool Breakage Alone

These chucks have proven their ability in hun-  
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production. The design and construction are  
such that it will slip before the BREAKING  
POINT of the tool is reached. On the hard-  
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breaking it.

Capacity—from smallest to 3" taps. Free  
Floating Tap Collets insure true-tapped holes.  
Also furnished with collets for Morse Taper  
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Morse Taper shanks are standard. Special  
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Unequaled for tapping, reaming, deep-hole  
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Try one of these tools on your toughest  
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Made in Various  
Sizes and Styles  
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## SILVER STEEL SAWS

The BLUE END Blades cut  
more metal than any other  
hack saws made — bar none.



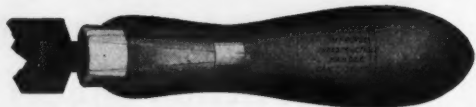
Buy them  
from your  
local distribu-  
tor—if he cannot  
supply you write to  
us, we will see that you  
are supplied promptly.

**E. C. ATKINS  
AND COMPANY**

458 So. Illinois St., Indian'pls, Ind.

## Osgood "Junior" Safety Indestructible File Handle

The illustration shows the Osgood "Junior" Safety Indestructible File



Osgood "Junior" Safety Indestructible File Handle

Handle, now being marketed by J. L. Osgood Machinery & Tool Co., Inc., 43 Pearl St., Buffalo, N. Y. The handle is made of wood of the best grade, especially selected for this purpose and treated to add to its toughness and resistance to wear. It is correctly shaped for a balanced hand grip and the wood provides a non-slip surface that can be gripped without tiring the hand.

The file-tang is held securely in the handle by a single-wall "never-loose" ferrule and an interior anti-split shank pressure resisting ring. The handle is made in five sizes, graduated from 4 in.

long to 5½ in. long and in diameters from 1½ in. long to 1½ in., for files from 2 in. to 20 in. in length.

## Fox Hydraulic Power Press

Hydraulic Power Presses designed particularly for use in production shops are now being built by the Fox Machine Company, Jackson, Michigan. The illustration shows an eight ton press with a "C" type frame. In addition to table heights as shown on the illustration, low tables are also offered. With low tables and various depths of filler blocks to fit on the tables, the presses are capable of receiving a large variety of work.

The frames are being made of hot rolled steel plates suitably cut, welded, and annealed. The result is a one-piece frame of generous strength in addition to a pleasing appearance. Although the presses are offered with standard dimensions, this method of building the frame makes it possible to furnish presses built to special dimensions at very little more than the regular cost.

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**DIE SETS**

SEMI-STEEL

DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, and a listing of more than 95,000 stock sizes, afford a service that is unsurpassed.

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SPECIAL GEARS	SPROCKETS

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FOR ECONOMY

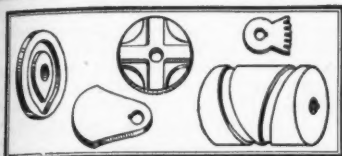
All types for dressing grinding wheels. Shaped Diamond Tools, etc. Large stock unset stones on hand. Resettings and resharpenings returned same day received.

Send for price list and specify your requirements.

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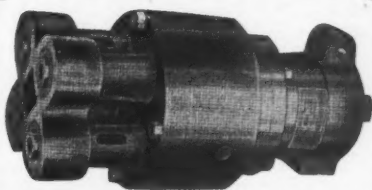


**CUTTING**  
ALL STYLES CAMS SIZES UP TO 50"  
GENEVA MOTIONS  
**KUX-LOHNER MACHINE CO.**  
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PLUGS RINGS  
PROFILES SNAPS  
ALL SPECIAL TYPES  
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## MULTIPLE UNITS FROM SINGLE DRILLS

U. S. Drill Heads quickly convert any single spindle drill into a multiple unit. Heads are standard or special design, depending on your job. We make recommendations on drilling problems without obligation. Send your blueprints for estimates.

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## MODERN "SELF-OPENING" STUD SETTERS ARE USED

IN 90% OF THE AUTOMOBILE SHOPS

**Because They Are Speedy, Accurate  
and Their Action Instantaneous**

This tool will set studs to an absolute given height, and is so constructed that the threaded jaws remain in full contact with the thread on the stud until the opening action takes place. The drive is through a clutch which is adjustable for length. The jaws are fulcrumed at the top through the driving clutch, which keeps them in absolute line with each other, preventing the marking of stud being set.

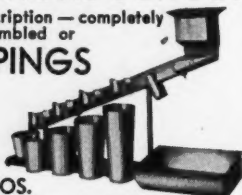
### OTHER MODERN PRODUCTS

Other "Modern" Products include stationary and revolving self-opening die heads, solid adjustable die heads, adjustable hollow milling tools, collapsible taps, friction tap collets, self-opening stud setters, tapping attachments, chaser grinders, inserted blade milling cutters.

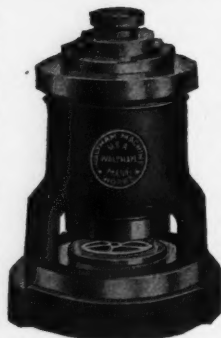


**MODERN TOOL WORKS**  
ROCHESTER, N. Y., U. S. A.

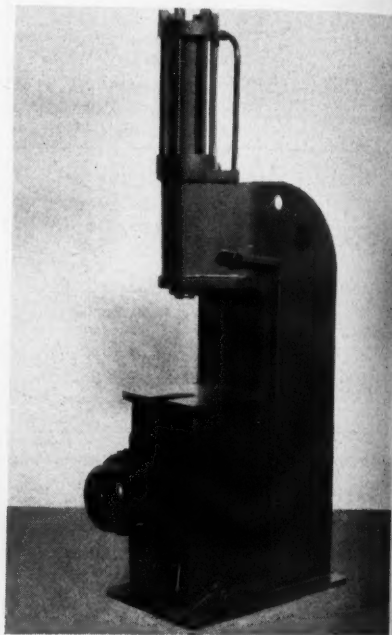
DIVISION OF CONSOLIDATED MACHINE TOOL CORPORATION OF AMERICA

**MECHANICAL DEVICES**of every description — completely  
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Sample  
Runs**GERDING BROS.**Mechanical Productionists  
5 E. Third St. Cincinnati, Ohio**Mummert-Dixon  
Facing Heads**

8 Sizes—6" to 40"

We can't say much  
here . . . but if you  
write for a bulletin  
we'll show you how  
this tool will save  
you money.**MUMMERT-DIXON CO.**  
120 Philadelphia Street  
Hanover, Pa.**CYLINDRICAL  
SUB-PRESSES**Are especially  
desirable for pro-  
ducing clean cut,  
accurate parts  
with compound  
dies. For after  
operations, swag-  
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trimming, etc.,  
the overhang  
type is preferred.  
We have had a  
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in making such  
dies. Please send  
us samples or  
drawings for  
estimate.**ARCH TYPE****Waltham Machine Works**

WALTHAM, MASS.

Vickers pumps are used with either  
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When the ram is in its proper position  
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stroke) the pump delivery is by-passed  
so that the pump is working against no  
pressure. If the full tonnage is wanted  
at a slow ram speed, a fast traverse to**Fox 8-Ton Hydraulic Press**the work at low tonnage and then auto-  
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provided for.The presses as illustrated are being  
furnished with the oil reservoir and  
pump mounted within the frame. All  
piping is so located that any leaks that  
might develop will drain back to the  
reservoir through a suitable filtering de-  
vice. The pump also is mounted in the  
reservoir so that no leakage can appear  
on the outside of frame or find its way  
onto the floor.The Fox Machine Company is pre-  
pared to design and build fixtures to be  
used with these presses in performing as-  
sembling, straightening, die testing, or  
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**COMMERCIAL****Centerless Grinding**

Straight cylindrical, shoulder and profile surfaces, hardened straight dowel pins and taper pins ground to your specifications.

Also specialize in small screw machine parts—hardening if necessary—and finished by Centerless Grinding.

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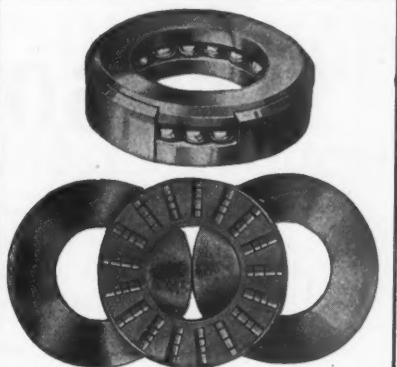
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Special Bearings Made to Order.

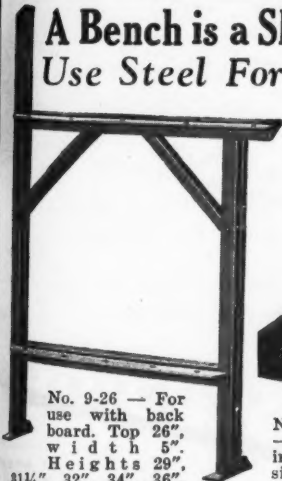
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Catalog Upon Request

**THE G.WILLIAM CO.**

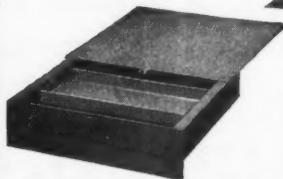
358 Furman St., Brooklyn, N. Y.

**A Bench is a Shop Necessity  
Use Steel For Permanence**

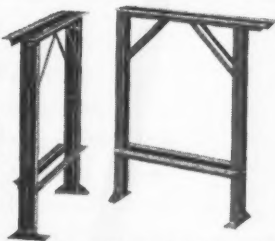


No. 9-26 — For use with back board. Top 26", width 5". Heights 29", 31 1/4", 32", 34", 36".

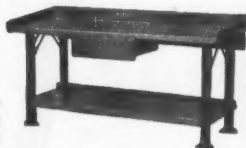
The Bench Legs and Drawers come to you all ready for you to quickly build your own benches by bolting on wood tops, shelf, and brace.



No. 1218-PCT Bench Drawer — Built of sheet steel, with inner sliding tray. Various sizes to choose.



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No. 48-30 All-Steel Bench — A complete steel bench. Three widths, two depths, four heights. Shipped knocked down, for easy bolted assembly.

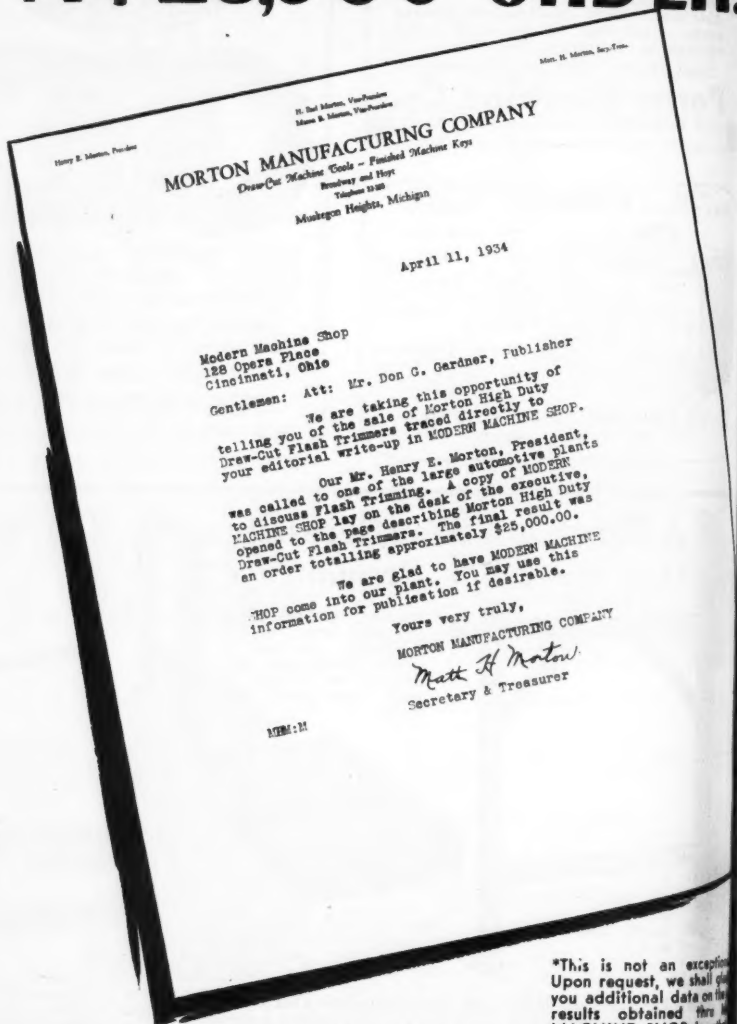
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**ANGLE STEEL STOOL COMPANY**

"The Steel Equipment People" PLAINWELL, MICH.

May, 1934

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Following is a quotation from another letter dated April 11, 1934, from the Sutton Tool Co., Detroit, Mich.:

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704 Race Street

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*"The most widely read metalworking magazine in the world."*

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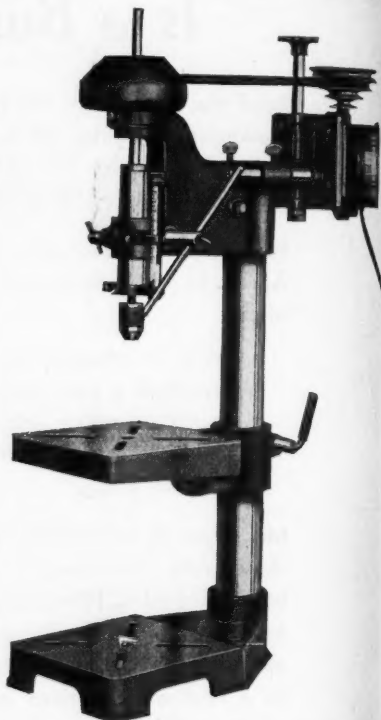
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Mfd. **Anderson Bros. Mfg. Co.**  
1926 Kishwaukee St., Rockford, Ill.

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

### Atlas Drill Press

The Atlas Press Company, 1846 N. Pitcher St., Kalamazoo, Mich., has brought out a drill press in four sizes—three sizes for bench use and one built with a pedestal for floor service. The press is



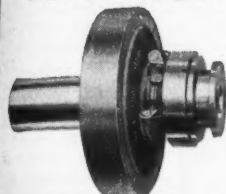
Atlas No. 60 Bench Drill Press

built for accuracy and hard service, and every part is designed to meet these specifications.

The feature of the machine is the bearing construction. SKF ball bearings are used in the three larger sizes, and the small press has oilless bearings throughout. The No. 50 bench press and the No. 70 floor press each have four large bearings; two in the quill and two more above the quill, in the head. This construction is intended to insure spindle accuracy and long life under the most rigorous requirements of heavy production. The No. 50 bench press has three

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### WASHERS

Over 2000 dies for washers in any gauge and materials, made to order. Will gladly send our die list upon request.

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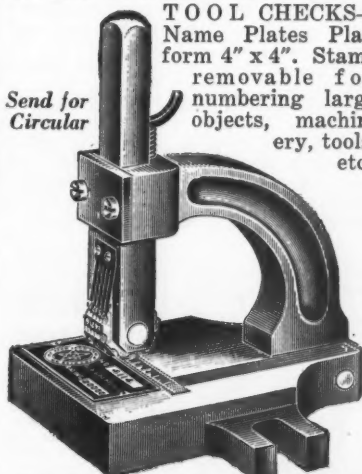
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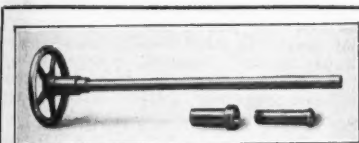
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Name Plates Platform 4" x 4". Stamp removable for numbering large objects, machinery, tools, etc.

Send for Circular



**Numberall Stamp & Tool Co.**

Huguenot Park, Staten Island, N. Y.



**Collet Attachments for your lathes and millers**

Write for Bulletin No. 100 A. M.—  
Rivett Draw-In Collets and Chucks.  
Also Price List and Dimension Sheet.

**Rivett Lathe & Grinder Corp.**

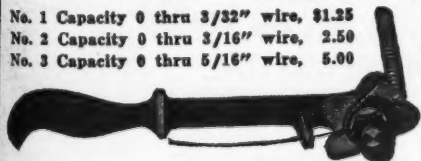
Brighton Dist., Boston, Mass., U. S. A.

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BOSTON, MASS.

ball bearings; two in the quill and a third in the head directly at the center of the four-step spindle pulley. These machines are designed to produce fine work at speeds up to 10,000 r. p. m. The No. 40 press is equipped with large oilless bearings and is intended to produce fine work at speeds up to 3,000 r. p. m.

All four sizes of presses are equipped with full tilting tables that can be locked in any position. The tables are regularly made with angular slots, but may be had with rectangular slots if preferred. The bench models are supplied in both direct motor drive style or with adjustable idler pulley for separately-mounted motors. A round base can be supplied for the floor model if desired.

The No. 40 bench press is 28 in. high, spindle travel is 3 in., drills to center of 12 in. diameter circle, and has eight speeds from 1,000 to 3,000 r. p. m. The No. 50 bench press is 34 in. high, spindle travel is 3 in., drills to center of a 13-in. circle, and has nine speeds from 600 to 5,200 r. p. m. The No. 60 bench press and No. 70 floor press have spindle travel of 4 in., drill to center of a 15-in. circle, and have nine speeds from 600 to 5,200 r. p. m. Either  $\frac{1}{4}$  h. p. or  $\frac{1}{3}$  h. p. motor will be supplied as requested.

### "BOND GEARING AND POWER TRANSMISSION HANDBOOK"

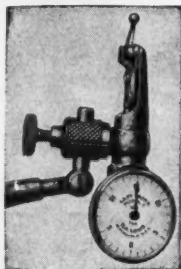
The above title is descriptive of the Bond Catalog No. 57 of Stock Gears and Speed Reducers, which has been issued by the Charles Bond Company, 617-A Arch St., Philadelphia, Penna. The book

is intended for the use of designing engineers, chief engineers, power transmission engineers, conveyor engineers, and other mechanical engineers who are concerned with the use of gears and gearing, either in machine design, in construction, or for maintenance purposes.



The book is of convenient pocket size and contains 176 pages of information, a part of which comprises a list of the sizes and prices of gears that can be supplied by the Charles Bond Company—and the range is practically unlimited. A section is devoted to sizes, descriptions, and prices of gear reduction units for all purposes, and still another section describes and illustrates this company's other products such as flat and grooved pulleys, shaft hangers, pillow blocks, hardened steel washers, universal joints, insulated couplings, roller bearings, truck casters, and steel bench legs.

Of particular interest is the part devoted to engineering data. This section includes tables of gearing sizes and specifications, definitions of gear part terms, rules and formulas for gear design and cutting, tooth dimensions, table of horsepower of gears, S.A.E. specifications of carbon steels, and other useful information. Copies free upon request.



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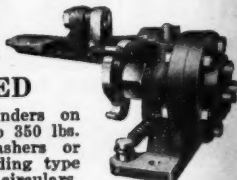


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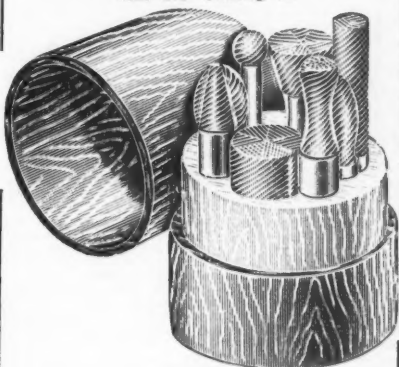
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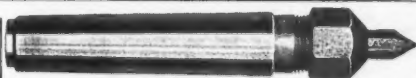
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Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than five.

**Ames Dial Gages:** Dial gages, gage heads, cylinder gages, dial thickness gages, dial micrometers and special gages and attachments made by the B. C. Ames Company, Waltham, Mass., are described and illustrated in Catalog 50. Write for copy.

**Scrape by Power:** Bearing surfaces can be scraped with a power scraper that is quicker and easier than the antique hand method. Write for information to Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill.

**Steel Furniture for Office and Plant:** Industrial furniture of steel, designed for efficiency and built for service, is described and illustrated in a catalog that has been issued by Angle Steel Stool Company, Plainwell, Michigan. Copy free.

**Stop Tap Breakage:** A booklet that tells how to stop the breakage of taps, reamers, and other tools, by the use of a friction chuck, also how to use the chuck for setting studs or nuts, has been issued by The Apex Machine & Tool Co., 200 Davis Avenue, Dayton, Ohio. Sent free upon request.

**A New Deal in Hacksaw Blades:** "Blue End" Hacksaw Blades reduce costs by cutting faster and lasting longer. Write for data and prices to E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.

**"Atlas" Bench Lathe:** A 9-in. screw cutting, self-contained, motor-driven bench lathe is now being built by Atlas Press Co., Kalamazoo, Mich. Write for circular.

**Barber-Colman Cutters:** Catalog "J", issued by Barber-Colman Company, Rockford, Ill., describes and illustrates the complete line of milling cutters, hobs, reamers, and other tools made by this firm. Send for a free copy.

**"Ground-From-The-Solid" Taps:** Bath taps are hardened in the solid, then the teeth are generated by grinding, producing absolutely accurate taps. Write for the "Ground Thread Handbook", free. John Bath & Co., Inc., Worcester, Mass.

**Drop Forged Steel Die Sets:** The economy and other advantages of drop forged steel die sets, which are now being made by E. A. Baumbach Mfg. Co., 1806 South Kilbourn Avenue, Chicago, Ill., are explained in a folder that can be had by addressing this firm.

**Gears and Speed Reducers:** Catalog No. 57, issued by the Charles Bond Co., 617-A Arch St., Philadelphia, Pa., contains a wealth of information regarding gears and power transmission devices for the engineer who is concerned with the uses of gears or other forms of power transmission. Copy free upon request.

**Brighton Safety Set:** Screws provide an important factor of safety. No heads to project. The Brighton Screw & Mfg. Co., 1450 Harrison Ave., Cincinnati, Ohio.

**Fine Tools of All Kinds** are described and illustrated in a new catalog that has been issued by Brown & Sharpe Mfg. Co., Providence, R. I. Copy free.

**Buckeye Pneumatic and Electric Tools—drills, grinders, nutsetters, screwdrivers, polishers, buffers and other tools** are fully described in the "Hercules" Catalog. Write for copy to The Buckeye Portable Tool Co., Dayton, Ohio.

**645 Stock Sizes of Bronze Bushings** are listed with dimensions and prices in the Buckeye Stock List "G". Write for it. Buckeye Brass & Mfg. Co., 6410 Hawthorne Ave., Cleveland, Ohio.

**Bushings and Bearings:** 500 sizes of finished bronze bushings that are available immediately are shown in a catalog that can be had by writing to The Bunting Brass & Bronze Co., Toledo, Ohio.

**Carboly Cost-Saving Tools:** This booklet, issued by Carboly Company, Inc., 2485 E. Grand Blvd., Detroit, Michigan, shows a variety of types and designs of Carboly tools which will increase production and reduce machining costs. Copy free upon request.

**Quick Change Collets** for faster cutter changing in your toolroom. Only 20 seconds required to remove a quick change collet and replace with another. A variety of operations can now be performed with one setting of the work. Write for sheet FM-493. Address Cincinnati Milling Machine Co., Cincinnati, Ohio.

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**"Circle R" Saws** for cutting metal, made in both carbon and high speed steels, from  $\frac{1}{4}$  in. to 10 in. in diameter, are now available. Write to Circular Tool Co., Inc., 767 Allens Ave., Providence, R. I., for catalog.

**Balance Your Parts the Micro-Poise Way:** Vibration can be removed from flywheels, fans, wheels, and other rotating parts by eliminating dynamic unbalance. Ask Commerce Pattern Foundry & Machine Co., 2213 Grand River Ave., Detroit, Michigan, for full information.

**Centerless Grinding:** A high-speed service at low cost. If you have cylindrical parts to be ground, send blue-prints for estimates to Commercial Centerless Grinding Co., 5338 Carnegie Ave., Cleveland, Ohio.

**Motorize Your Cone Pulley Lathes:** An attachment that can be applied to your lathe with four bolts makes it possible to motorize and modernize your lathes. Write for information to Cullman Wheel Co., 1336 Altgeld St., Chicago, Ill.

**"St. Louis" Grinders:** Before buying a floor grinder for either light or heavy duty, write for a circular describing the "St. Louis" grinder. Address Cutter Machine Co., 3723 Commonwealth Ave., St. Louis, Mo.

**David Keyseaters:** The newest methods of keyseating are discussed in a bulletin that also describes and illustrates the keyseating machines made by the David Keyseater Co., 250 Mill St., Rochester, N. Y. Copy free upon request.

**Delta "Hand Milling Tools":** The features that entitle Delta files to be called "hand milling tools" are discussed in a booklet that can be had by addressing The Delta File Works, 4337 James St., (Bridgesburg), Philadelphia, Pa.

**Economy in Drilling Equipment:** A high grade drill press, built to sell at an economical price, is described in a circular that will be sent free upon application to Delta Mfg. Co., 3775 N. Holton St., Milwaukee, Wis.

**Grinding Wheel Dressers:** All of the different types of grinding wheel dressers made by the Desmond-Stephan Mfg. Co., Urbana, Ohio, including Desmond-Huntington, Desmond-Sherman, Zig-Zag, Diamo-Carbo, and diamond dressers, are described and illustrated in a catalog that has been published by the firm mentioned. Free upon request.

**Alloy Tool Steels for Cutting Tools:** For Die or for Parts Manufacture: Write to Detroit Alloy Steel Co., Foot of Iron St., Detroit, Michigan, for a free set of specialized literature, Series F, describing the uses and advantages of modern alloy tool steels.

**Assembly by Power:** A power screwdriver that will set and screw in machine screws at a rate of from 400 to 500 screws an hour is described in a folder that can be had by writing to the Detroit Power Screwdriver Co., 5365 Rohms St., Detroit, Mich.

**Steel Spacing Washers:** Milling jobs can be set up quicker by using standard spacing washers made by Detroit Stamping Co., 1345 West Fort Street, Detroit, Michigan. Write for information.

**Simplicity Plus Efficiency in Couplings:** A coupling that is simple in construction, yet positive and long-lived, is described in Catalog No. 11, which will be sent free upon application to Diamond Chain & Mfg. Co., 459 Kentucky Ave., Indianapolis, Ind.

**Cut Your Sawing Costs with Disston Inserted-Tooth Metal Saws.** Manual explaining features of construction, advantages of design and outstanding results obtained can be had by writing to Henry Disston & Sons, Inc., 421 Tacony, Philadelphia, Pa.

**Special Quills for Precision Grinding,** made by The Dumore Company, 28 Sixteenth St., Racine, Wis., are described and illustrated in a booklet that can be had by addressing the firm mentioned.

**Simplify Your Tooling:** You can simplify your tooling problems, reduce your tool inventory, and increase your production by using Eclipse method of tooling. Write for information to Eclipse Countertop Company, 7410-30 St. Aubin Ave., Detroit, Michigan.

**Edgemont Expanding Clutches** for countershafts and similar applications are described in full in Catalog H, issued by The Edgemont Machine Co., Inc., Dayton, Ohio. Copy free.

**"Speed" Spot Welders** for welding metals from .0005 in. to  $\frac{1}{4}$  in. thick are described in a catalog that can be had by addressing Eisler Electric Corp., 761 South 13th St., Newark, N. J.

**"The Dragon,"** is the name of a publication that is devoted to bearings and grinding problems. It will be sent without charge to any mechanical executive who will address his request to The Fafnir Bearing Company, New Britain, Conn., using his firm letterhead.

**Accurately-Cut Gears** of all kinds, types, and sizes can be had on short notice from Parrel-Birmingham Co., Inc., 381 Vulcan St., Buffalo, N. Y. Catalogs and engineering data on request, or submit your specifications for quotations.

**Precision Measuring Instruments:** The latest types and models of dial indicators, thread lead test gages, pitch gages, dial comparators, and other precision gages made by Federal Products Corporation, Providence, R. I., are described in a booklet that will be sent free upon application.

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**Ford Rotary Files.** M. A. Ford Mfg. Co., Davenport, Iowa, is issuing a catalog showing, in addition to the complete line of Ford Rotary Files, illustrations of rotary files in use on various kinds of jobs. Write for copy.

**Silent Gears:** A booklet telling about the modern silent gears and containing a fund of valuable information with rules and tables for laying out, cutting, and using gears can be had by writing to Formica Insulation Co., 4632 Spring Grove Ave., Cincinnati, Ohio.

**Drilling Machines of modern design—single spindle, gang high speed, and radial types—are described and illustrated in a catalog that will be sent upon request. Address The Fosdick Machine Tool Co., Cincinnati, Ohio.**

**Gairing Production Tools:** The complete line of production tools made by The Gairing Tool Company, 1829 W. Lafayette Ave., Detroit, Michigan, is described and illustrated in a catalog that can be had by addressing this firm.

**Special Genesee Production Tools:** A bulletin issued by Genesee Manufacturing Co., Inc., Rochester, N. Y., describes and illustrates some of the special production tools made by this company. Copy free upon request.

**Stampings of any kind or size can be obtained from Gerding Brothers, 5 East Third Street, Cincinnati, Ohio. Write for particulars.**

**Tool Chests:** Fine tools should be protected against damage or theft, and the best way is to keep them in a fine tool chest. Write "Gerstner Tool Chests" 1227 Columbia St., Dayton, Ohio, for catalog of fine chests.

**Constant-Level Oilers** will keep your electric motors properly oiled with a minimum of care. Write for details to Gits Bros. Mfg. Co., 1847 S. Kilbourn Ave., Chicago, Ill.

**"Tools That Go and Go"** is the title of a catalog describing and illustrating the milling cutters, inserted tooth cutters, railroad work cutters, expansion reamers and mill thread holes and other cutters made by Goddard & Goddard Company, 12280 Burt Road, Detroit, Mich.

**Prevent Dermatitis:** Skin infections from cutting oils and lubricants can be prevented. Write for information to James Good, Inc., 219 E. Susquehanna Ave., Philadelphia, Pa.

**3-Speed Riveters** designed for high production and hard service over a long period of time are fully described in a catalog that will be sent upon request to Grant Mfg. & Machine Co., 96 Silliman Ave., Bridgeport, Conn.

**Cut Your Die Costs** by using a continuous filing machine of Write to Grob Brothers, West Allis, Wis., for information and prices.

**Swiss Files:** The complete line of Grobet Swiss Files for use in die work or other fine work, is described and illustrated in a catalog that can be had by addressing the Grobet File Corporation of America, 3 Park Place, New York, N. Y.

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**Variable Speed Grinding and Polishing Machines:** will produce better work at lower costs. Write for catalog of polishing and grinding equipment to Hammond Machinery Builders, 1615 Douglas Ave., Kalamazoo, Mich.

**"Haskins" High Speed Tappers** will tap your holes at highest speed, with tap breakage practically eliminated. Tapping speeds up to 3,000 r.p.m. Write R. G. Haskins Co., 4667 West Fulton St., Chicago, Ill.

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**Pyrometers:** Inexpensive portable and stationary single unit and multi-circuit pyrometers are described in a catalog issued by Illinois Testing Laboratories, Inc., 146 West Austin Avenue, Chicago, Ill. Copy free upon request.

**Solve Your Tapping Problems with a Jarvis Tapper.** Tapping devices for every type of job. Write The Charles L. Jarvis Co., Gildersleeve, Conn., for information and prices.

**"Always Blowing Bubbles"** is the title of a 4-page folder that describes in detail the advantages of using Johnson Universal Bronze Bars. Write for copy to Johnson Bronze Company, New Castle, Pa.

**Diamond Tools** for dressing grinding wheels can be obtained from E. Karslen, Inc., 15 West 44th St., New York, N. Y. Also dressers reset and sharpened. Write for information.

**Cams—Any Style—Any Size—up to 50 inches** can be had from Kutz-Lohner Machine Co., 3147 Lexington St., Chicago, Ill. Write for data.

**Threading Machinery:** Complete catalogs of individual bulletins covering the pipe threading and cutting machines, bolt threading machines, or die heads made by Landis Machine Co., Waynesboro, Penna., may be had upon request from this firm. State size and type of machine or die head.

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**Air-Operated Work-Holding Devices:** A booklet showing how air-actuated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

**L-R Flexible Couplings** are simple, resilient, reversible. Only three parts. Write Lovejoy Tool Works, 803 West Ohio St., Chicago, Ill., for information.

**"Last Word" Indicators**, built for accuracy, adaptability, and dependability are described in a circular that can be had by addressing H. A. Lowe Co., 1875 East 66th St., Cleveland, Ohio.

**Magnolia Bronze Bar Stock**, semi-finished inside and outside in S. A. E. specifications is now available. Write to Magnolia Metal Company, Elizabeth, N. J., for folder.

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**Mendes Diamond Point Angle Tools for Wheel Dressing** are described in Folder "M", issued by Mendes Cutting Factories, Inc., 105 West 40th St., New York, N. Y. Copy free upon request.

**Time Study Watches**, built for accuracy and service are described in Folder No. 3, issued by A. B. & J. J. Meylan, 269 West 40th St., New York, N. Y. Ask for copy.

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**Morflex Coupling:** All the qualities you have wished for in a flexible coupling are inherent in a coupling that is now being made by the Morse Chain Co., Chicago, N. Y. Write for bulletin.

**"Practical Machinist's Guide"**, A handy shop manual, containing tables of tapers, speeds and feeds, instruction for grinding twist drills, thread dimensions, tap drill sizes, and other useful information can be had by writing to Morse Twist Drill & Machine Co., Dept. 32, New Bedford, Mass.

**Morton Finished Machine Keys:** Any shape of machine key you wish can be furnished by Morton Manfg. Co., Muskegon Height, Mich. Write for Bulletin 15B of Morton Patented Hi-Pro Keys.

**Compound Spot-Facing Tool:** A spot-facing tool containing retracting, serrated roughing cutters and fixed finishing cutters in the same tool will break up the scale easily and do accurate work. Write for bulletin to National Machine Tool Co., 120 Philadelphia St., Hanover, Penna.

**Mill Keyseats with a Drill Press:** A special attachment that can be applied to a drilling machine for milling keyways is now being made by National Machine Tool Co., 2271 Spring Grove Ave., Cincinnati, Ohio. Ask for circular.

**Speed and Accuracy in Drilling Holes** are assured by the use of a Universal Drilling Plate. Write for full details to National Tool & Machine Co., 41 So. Water St., Rochester, N. Y.

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**Ball and Roller Bearing Data Sheets:** A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

**Stamp with Numeral:** The complete set of figures or letters all combined in one tool, preventing loss of single letter or digits. Write for catalog, Numeral Stamp & Tool Co., Huguenot Park, Staten Island, N. Y.

**Speed Reducers:** Speed Reducers to obtain any desired reduction up to 24,000 to 1 are described and illustrated in Catalog 29A, issued by The Ohio Gear Co., 1835 East 179th St., Cleveland, O. Copy free upon request.

**Die Making Machines:** How dies, templates, pages, etc., can be sawed out, filed, and lapped easily and accurately by the Oliver die making machines, is fully described in a bulletin issued by

the Oliver Instrument Company, 1430 Manumee Street, Adrian, Mich. Mailed upon request.

**No More Cut Hands** caused by using files with unguarded tangs. Write to J. L. Osgood Machinery & Tool Co., Inc., 43 Pearl St., Buffalo, N. Y., for bulletin of Osgood Safety File Handles and Safety File Grips.

**17 Years of Research in Rust Proofing** are incorporated in the information contained in a book on "Parkerizing", issued by Parker Rust-Proof Co., 2204 East Milwaukee Ave., Detroit, Mich. Ask for copy.

**Good Gears of all kinds**—spur, spiral, bevel, worm, hypoid—in fact any kind or type of gear desired, large or small, machined to an excellent finish and the highest degree of accuracy may be obtained from Perkins Machine & Gear Co., 151 Circuit Ave., Springfield, Mass. Write for estimates.

**Reduce Grinding Costs:** Let the Perkins Machine Co., 3120 Forrer Ave., Cincinnati, Ohio, grind your straight, cylindrical, shoulder, and profile surface work by the centerless method at low cost. Send blue prints for quotations.

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**Any drill press** is a tapping machine when a Procrunier Tapping Attachment is used with it. Write for descriptive circular. Procrunier Safety Chuck Co., 12 So. Clinton St., Chicago, Ill.

**Production No. 601 Machine** for sanding, surfacing, polishing, burring; leaves a straight line finish; eliminates hand labor. Write Production Machine Co., Greenfield, Mass., for illustrated folder.

**Bench Lathe Mounting and Driving Equipment:** Bulletin 120-A, issued by Rivett Lathe and Grinder Corporation, Brighton, Mass., contains complete descriptions and illustrations of modern and conventional countershaft, individual motor drive jack shaft, and speed box motor drive, also benches, cabinets, oil pans, etc. Copy free upon request.

**Foot-Controlled Air-Valve:** Air-operated equipment can now be controlled by valves that are operated by the foot, leaving the hands free to operate the machine. Write for information to the Ross Operating Valve Co., 6488 Epworth Blvd., Detroit, Michigan.

**Rotor Air Tools:** The latest types of air-operated hand tools for grinding, polishing, drilling, and other similar operations are described and illustrated in a 24-page book that can be had by writing The Rotor Air Tool Company, 5704 Carnegie Ave., Cleveland, Ohio.

**End Your Coolant Troubles** by using a Ruthman Gusher Pump. Write for information to Ruthman Machinery Co., 536 East Front St., Cincinnati, Ohio.

**The Ideal Speed Lathe** for lapping, finishing, polishing, and other similar operations is described in a special bulletin that can be had by writing to The Schauer Machine Co., 905 Broadway, Cincinnati, Ohio.

**Cut small gears, pinions, ratchets, automatically.** An automatic hobbing machine for small work with magazine feed is described in Catalog WML issued by Geo. Scherr Co., 130 Lafayette St., New York, N. Y. Write for free copy.

**"Diamonds for Industrial Purposes":** An interesting treatise on the history, composition, features, and classifications of diamonds. Copy free to mechanical executives. Address Selma Hersanite Corporation, 24 State St., New York, N. Y.

**Simonds Files:** A useful book on files showing the various styles made, their uses, cross-section, and cuts, and containing a number of reference tables and other information useful in a machine shop can be had by addressing Advertising Dept., Simonds Saw & Steel Co., 470 Main Street, Fitchburg, Mass.

**The Live Center you have been Looking For:** The Sturdimatic Live Center has eight outstanding features; just what you have been looking for. Ask for bulletin and prices. Sturdimatic Tool Co., 5222 Third Ave., Detroit, Mich.

**Cutting and Grinding Facts:** A discussion of cutting oils and lubricants together with descriptions and illustrations of various types of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Co., 1608

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URBANA, OHIO

## NEW — for Super-Rigidity

Tubular upright and rod of large diameter give super-rigidity with lightness.

### New Clamps

Lever style clamps give quick and positive clamping (note improved clamp for upright).

*Circular on request*

Brown & Sharpe Mfg. Co.  
Providence, R. I., U.S.A.

Nos. 731 and 731-A

**Dial Test Indicators**  
a new Brown & Sharpe Tool



No. 731 reads to .001". No. 731A, with jeweled bearings, reads to .0001".



Walnut St., Philadelphia, Pa. Copy free upon request.

**Sutton "Sur-Grip" Collets** with Diamond Serrations are fully described in a folder that will be sent without charge upon application to Sutton Tool Company, 2842 W. Grand Blvd., Detroit, Mich.

**"Midget" Five-In One Slide Rule** is a combination of Mannheim, Polymetric, Log-Log, Binary, Add and Subtract Slide Rule. Is 4 in. diameter, gives equivalent of 12-in. rule. Write to Tavelle Sales Co., 21 West Broadway, New York, N. Y., for catalog and prices.

**Your Arbor Press is a Keyway Cutter** when it is equipped with Threadwell Keyway Cutting Tools. Simple, economical. Write for bulletin. Threadwell Tool Co., Greenfield, Mass.

**Chuck With Air:** How time and labor can be saved by the use of air-operated chucks, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

## CUT KEYWAYS

With

Threadwell Keyway Cutters  
and  
YOUR Arbor Press  
and

CUT COSTS

Bulletin on request.

THREADWELL TOOL CO.  
Greenfield, Mass. U. S. A.



## THREAD MEASURING WIRES,

Gear Wires, Gage Blocks, Plug Gages, Microgage Layout Tool, Micrometer Laps, Flat Laps, Cylindrical Laps, Steel Surface Plates, Shop Triangles, Sine Bars, Light Wave Apparatus, Bench Micrometers, Flatness Testers, Deflection Bars and Special Gages.

WRITE TODAY FOR YOUR 1934 CATALOG  
THE VAN KEUREN CO.

Watertown

Mass.

**Beautify and Protect Your Product** by applying a coating of Udylite-Cadmium. Ask Udylite Process Co., 3939 Bellevue Ave., Detroit, Mich., for complete information as to equipment required, methods, costs, etc.

**Steels for shafting, manufacturing, and all other purposes** where cold finished steels are required can be had in a wide range of sizes, ready for use. Ask Union Drawn Steel Co., Massillon, Ohio, for name of nearest distributor.

**Universal Drill Bushings:** Interchangeable Nitrided Drill Bushings, and Universal Tool Holder your production problems. Write for Data Sheets, Shanks for end mills and other tools will simplify Universal Engineering Co., Frankenmuth, Michigan.

**Accuracy to the Hundred-Thousandth** can be determined by the use of Light-Wave Testing Equipment. A catalog describing light-wave micrometers, light-wave flatness testers, thread measuring wire, precision gage blocks, and other fine tools can be had by addressing The Van Keuren Co., Watertown, Mass.

**"Extra Value" Hack Saw Blades:** Hack saw blades made of an alloy in which molybdenum is used, and which are said to withstand shock and wear to an unusual degree are now being made by Victor Saw Works, Middletown, N. Y. Full particulars will be sent upon request.

**Waltham Cylindrical Sub-Presses** may be adjusted for wear and perfect alignment can be maintained. Booklet on Sub-Presses and Dies can be had by addressing Waltham Machine Works, Waltham, Mass.

**Expanding Mandrels Will Solve Your Problem:** A set of 12 "Champion" Expanding Mandrels will fit any hole from  $\frac{1}{8}$  in. to  $6\frac{1}{2}$  in. Write for details to The Western Tool & Mfg. Co., Springfield, Ohio.

**Feed Stock from Coils at High Speed:** Bulletin MS, issued by Wittek Manfg. Co., 4305 W. 24th Place, Chicago, Ill., gives full details regarding the Wittek Automatic Roll Feed for Punch Presses. Copy free upon request.

## For COST and OPERATION ANALYSIS

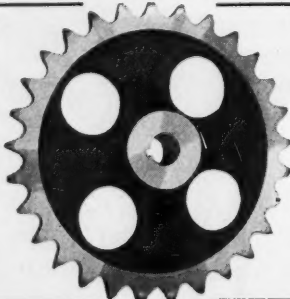


Makes one revolution of 100 divisions in one minute. Other timers with different calibrations—30 types—facilitate quick, accurate time and motion study calculations.

Send for Booklet 5

A. R. & J. E. MEYLAN  
264 West 40th St.  
New York

Stop-Watch  
Specialists



## Cullman Sprockets

For

Roller, Block and Silent Chains

Over 45,000 in Stock

Cullman Wheel Company

1336 ALTGELD ST.

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1934

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# MODERN

# Machine Shop

May 1934

CINCINNATI



## COME AND SEE US...

For you . . . your men . . . and your organization . . . we have helpful ideas, new methods and profit-earning milling and grinding machines.

We want your ideas . . . your experience. Working together, we can accomplish much to our mutual advantage.

On our 50th Anniversary, we cordially invite you to visit us. We are making a special effort to see that your visit will be pleasant and of maximum value and profit to you.

THE CINCINNATI MILLING MACHINE CO.  
CINCINNATI GRINDERS INCORPORATED

CINCINNATI

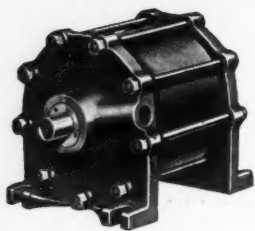
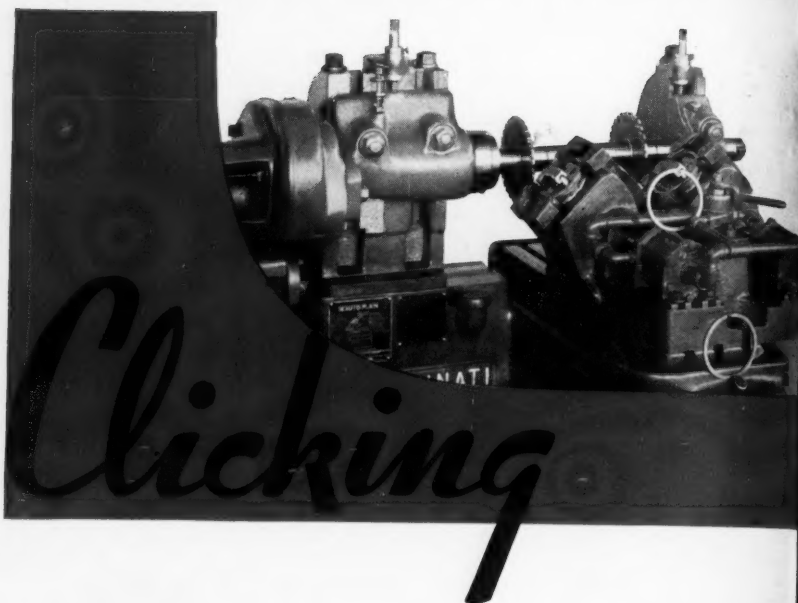
OHIO, U. S. A.

1884

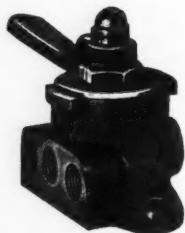


1934

## ANNIVERSARY



Non-Rotating Cylinders



Hand-Operated Valves

To watch this job in operation, you too would say, "It's CLICKING". 520 piston rings are slotted hourly on this Cincinnati 18" Plain Automatic Miller.

The LOGAN equipment, mounted on the machine table, is especially fast operating and contributes greatly to the productive capacity.

LOGAN Air and Hydraulic-Operated devices not only aid many prominent machine tool builders in working out ingenious work-holding methods, but also help manufacturers in many other industries to solve difficult problems.

*Put your problems up to LOGAN Engineers. No obligation.*

## THE LOGANSPOUT MACHINE CO.

LOGANSPOUT, INDIANA

*Designers and Manufacturers of Air and Hydraulic-Operated Devices for Every Work-Holding Requirement . . . and Many Other Purposes.*

May, 1

THE M

High Speed  
DRILLS,  
CUTTERS  
TAPS and  
SCREWS  
ARBOR  
COUNT  
MANDR  
TAPER  
SOCKET

There is  
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NEW YORK

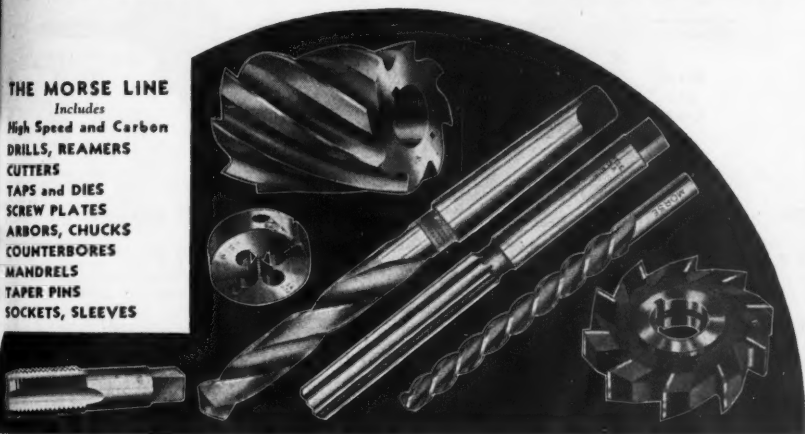


# THE PIECE-WORKER KNOWS THERE IS A DIFFERENCE

## THE MORSE LINE

*Includes*

High Speed and Carbon  
DRILLS, REAMERS  
CUTTERS  
TAPS and DIES  
SCREW PLATES  
ARBORS, CHUCKS  
COUNTERBORES  
MANDRELS  
TAPER PINS  
SOCKETS, SLEEVES



One of the greatest unofficial testers of small tools is the piece-worker. His pay envelope is a reliable indicator of how well the cutting tool is standing up — how rapidly and economically it is performing.

Piece-workers know that there is a difference in small tools. The fact that they so frequently insist on Morse Tools is one of the sincerest tributes which industry can pay to Morse quality. It is proof positive that you can count on steady production, fewer delays, longer working life from Morse cutters, reamers, drills, taps and dies.

## MORSE

TWIST DRILL & MACHINE COMPANY

NEW BEDFORD - - - MASS., U. S. A.

There is a Morse  
Distributor con-  
venient to you

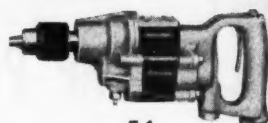
NEW YORK STORE: 92 LAFAYETTE STREET - - CHICAGO STORE: 570 WEST RANDOLPH STREET

# ROTOR AIR DRILLS

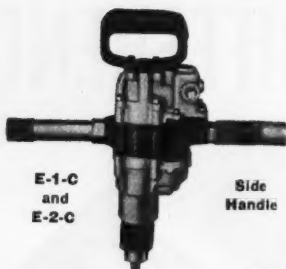
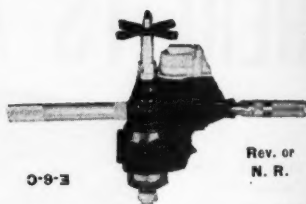
*Non-Reversible and Reversible*



E-O



E-1

E-1-C  
and  
E-2-CSide  
Handle

O-8-C

Rev. or  
N. R.

Type	Reversible or Non-Reversible	Capacity (Inches)			Free RPM	Weight (Lbs.)	THE WORK IT WILL DO	Price Machine Only Non-Rev
		Drill	Ream	Tap				
E-O	N. R.	1/4			3000	4	A light, powerful drill for small drilling, such as tell tale holes, lead holes, etc. Also furnished with straight handle for metal files, burrs, etc.	\$ 75
		3/8	1/4 - 5/8		2000			75
		1/2	1/4 - 5/8		1500			75
		3/4	3/8		1000			85
E-1	N. R.	1/4	1/4		1800	7 1/2	A heavy duty 1/4" and 3/8" drill.	85
		3/8	5/8		1500			85
E-1-C	N. R.	1/2	3/8	5/16	900	8 1/4	Compound geared for greater torque, light and simple in construction.	95
E-2-C	N. R.	1/2	1/2	3/8	750	8 3/4		95
E-1-C	N. R.	1/2	3/8	1/16	900	10 1/4	These drills may be equipped with any combination of side handle, feed screw, breast plate, or spade handle and Morse taper socket, wood bit chuck, or chuck.	95
Side Handle	N. R.	1/4	1/2	3/8	750	11 3/4		95
E-2-C		3/8	5/8	1/2	500			120
Side Handle		3/4	1	3/4	375			120
E-4-C	Rev. or	1/8	1/2	3/8	780		For drilling, reaming, nut-setting and woodboring these tools may be furnished with any desired equipment.	85
Side Handle	N. R.	3/4	1 1/2	1/2	570	13		120
E-40-C	N. R.	3/8	1 1/2	1/2	340			120
Side Handle	N. R.	3/8	1 1/2	1/2	500			120
E-6-C	Rev. or	1 1/4	1 1/2	1 1/2	500	26	A powerful, heavy duty drill, with compound gears, furnished with feed screw, spade handle, or breast plate. Also suspension eye-bolt.	150
Internal Spindle	N. R.	1 1/4	1 1/2	1 1/2	300	26		160
		1 1/4	1 1/2	7/8	200	26		170
All speeds with No. 2 or 3 Taper.								

Write For Rotor Drill Circular

## THE ROTOR AIR TOOL COMPANY

5600 Carnegie Ave.

Cleveland, Ohio

# Unusual Drill Press Value!

## A "Delta" Drill Press

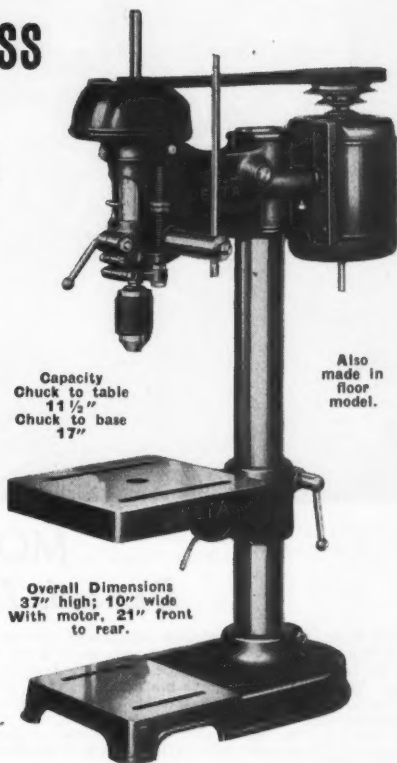
... built like \$75

... operates like \$75

... and offered at the  
Remarkably low price of

# \$27<sup>75</sup>

(Complete with Delta-Grip self-tightening chuck, belt and motor pulley. Motor extra. Also available with Jacobs balanced 1/2" capacity chuck at slightly higher price.)



Capacity  
Chuck to table  
11 1/2"  
Chuck to base  
17"

Also  
made in  
floor  
model.

Overall Dimensions  
37" high; 10" wide  
With motor, 21" front  
to rear.

Model 995 has very heavy cast-iron head, with motor mounted at rear. Four speeds, 590; 1,275; 2,450 and 5,000 r.p.m., suitable for high-speed drills from No. 60 to 1/2" diameter. Sturdy V-belt drive. Spindle runs in New Departure heavy-duty double-seal ball bearings. Spindle pulley carried on oversize New Departure bearing and takes all belt pull, none being transmitted to the spindle. Heavy, solid quill, accurately graduated and provided with adjustable "quick-set" pointer for convenience in depth gauging. Adjustable stop rod and nuts for automatic depth gauging anywhere within travel spindle. Spindle travel 4". Table measures 10" by 10".

Machine drills to center of 14" circle, and takes drills to 17/32". Interchangeable spindles available for No. 1 Morse taper and Jacobs chuck. Write for full details and name of nearest dealer in your vicinity; also for information about the new Delta Two-Spindle Drill Press and Delta Tapping Attachments.

## DELTA MFG. COMPANY

3775 N. HOLTON STREET, MILWAUKEE, WIS.



MONARCH 16"  
TOOL ROOM LATHE

## MODERN DAY PRACTICE Demands These Modern Machines!

**C**OMMERCIALLY inefficient equipment means a higher cost per unit. In this day and age, a machine should be retained only so long as no other machine will operate more economically. The Monarch Tool-Room Lathe, illustrated above, is regarded as today's very finest precision lathe. It will cut your costs materially! New in design, new in construction, new in operating efficiency, incorporating a wealth of new improvements, it carries on the Monarch tradition of leadership.

Just compare the many exclusive features of design that makes it easier to handle and more economical to operate than lathes of much smaller size:

- |                                                         |                                                                                                                                                               |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. 16-speed headstock.                                  | 7. Standardized flanged spindle nose.                                                                                                                         |
| 2. Timkenized quick-change gear box.                    | 8. Quick clamping tailstock.                                                                                                                                  |
| 3. Built-in leadscrew reverse.                          | 9. Anti-friction bearings throughout—55 in all. They eliminate wear and give unusual accuracy—enabling the operator to set the limits as close as he desires. |
| 4. All bearings in apron are of the anti-friction type. | 10. Improved lubrication. Headstock is oiled once a year, quick-change gear box oiled once a week, apron oiled weekly.                                        |
| 5. Apron feeds controlled by eccentric ball levers.     |                                                                                                                                                               |
| 6. End gear train mounted in anti-friction bearings.    |                                                                                                                                                               |

Write for literature

**MONARCH MACHINE TOOL CO., SIDNEY, OHIO, U.S.A.**

New York Sales Offices:  
413 Graybar Building.

**Monarch lathes.**  
Helical Gears - Timken Bearings  
SMOOTHER... QUIETER... MORE POWERFUL

Chicago Sales Offices:  
622 W. Washington Blvd.





# 20 Years of Progress

*May, 1934, marks our 20th Anniversary*

From a modest beginning of making Interchangeable Counterbore and Spotfacing Tools to its present position, that of leader in its field, is the record of Eclipse.

The success we have enjoyed has been due to the confidence and support of our customers and the loyalty and cooperation of our factory and sales organizations.

Listed below are some of the tools developed within the Eclipse organization that have contributed to its enviable position in the cutter industry.

INTERCHANGEABLE  
COUNTERBORES

TWO-PIECE CORE DRILLS

MICRO-JUSTABLE HOLDERS

FLOATING HOLDERS

MULTI-DIAMETER CUTTERS

BACK-SPOTFACING CUTTERS

H. S. STEEL INSERT CENTERS

RELIEVED TOOTH HOLLOW  
MILLS

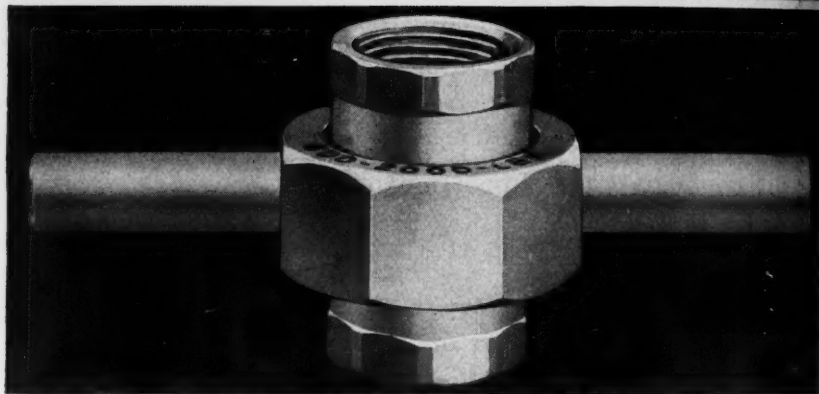


(PATENT  
PENDING)

*And Now The Eclipse Radical Double Drive Counterbore →*

**ECLIPSE COUNTERBORE COMPANY**  
**DETROIT 7410-30 ST AUBIN AVE MICHIGAN**

# ★★★ UDYLITE ★★★ CADMIUM PLATED



This forged steel "Handle-bar" pipe union, recently introduced by a prominent manufacturer of pipe fittings, is entirely Udylite-Cadmium plated because of the efficient protection against rust which this coating affords. Also, the Udylite-Cadmium coating follows the contours of the threads and does not fill them to interfere with positive operation.

In specifying Udylite-Cadmium for this product,

the manufacturer has the assurance that it is provided with dependable protection against corrosion; that the appearance is in keeping with the high quality of the product; that his finishing expense is at a minimum.

Udylite-Cadmium is the one electroplated coating offering the triple advantages of efficient rust protection; beauty and economy. It will pay you to investigate its possibilities.

★ Udylite jobbers, located in all principal cities, can provide you with Udylite-Cadmium coatings. Write to us for the name of nearest Udylite jobber.

## UDYLITE PROCESS COMPANY

3937 Bellevue Avenue Detroit, Michigan

New York  
30 E. 42nd St.

Chicago  
205 Wacker Drive

Cleveland  
708 Keith Bldg.

San Francisco  
114 Sansome St.

# DERMA-SAN

## DISINFECTANT

50 to



1

**DERMA-SAN IS VERY ECONOMICAL. HIGH CONCENTRATION ALLOWS GREAT DILUTION**

**H**ERE is the ideal disinfectant for all general plant sanitation. One pint of Derma-San added to every 50 gallons of cutting oil or compound, ends all threat of oil dermatitis. Or, 1 pint of Derma-San added to 50 gallons of scrub-water, makes an effective cleaning solution for toilets, floors, walls, etc.

Only Derma-San's power makes such great dilution possible, for it

is 15 times stronger than carbolic acid. It is non-toxic, non-corrosive and especially effective in warm weather, because it keeps oils from turning rancid.

You can buy no disinfectant as economical as Derma-San. It is low in price, and lasts 3 to 8 times longer than other disinfectants. Its use in your plant will save money, and end all danger of infections.

**The HUNTINGTON**



**LABORATORIES Inc.**

HUNTINGTON

INDIANA

TORONTO, ONT. 72-76 Duchess St.

• 999 Logan Ave. DENVER, COLO.

**MAIL  
THIS  
COUPON  
TODAY**

The Huntington Laboratories, Inc.,  
Huntington, Indiana.

Please send me prices and complete information on Derma-San Disinfectant.

Name \_\_\_\_\_

Address \_\_\_\_\_



# • Look at your finger!

Nature gave it a ribbed, "non-skid" surface to make it GRIP better. VIM TRED Leather Belting uses this same fundamental, time-proven principle. As a result it gives you 25% to 40% MORE GRIP than smooth belts.

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No long  
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milling.

LONGER LIFE PER GRIND  
HIGHER SPEEDS, FASTER FEEDS  
ROUGH AND FINISH CUTS COMBINED  
HARDER MATERIALS MACHINED  
GREATER ACCURACY MAINTAINED

**MILL WITH CARBOLOY CEMENTED CARBIDES**

REG. U. S. PAT. OFF.

**FOR GREATER  
SPEED, ACCURACY, ECONOMY!**

Can you save on machining costs by milling at higher speeds and faster feeds—by obtaining longer cutter life between grinds—by combining rough and finish cuts? Carboloy cutters can make this saving for you!

Will you benefit by greater accuracy, improved finish, minimum distortion of workpiece, milling harder materials? Carboloy cutters can bring you these benefits!

Carboloy cemented carbide milling offers you better quality of work and a greater margin of profit. Can you afford to be without Carboloy in these highly competitive days?

**\$85<sup>00</sup>**

5" diameter, 12-bladed, Carboloy general purpose cutter, as illustrated.



**New! LOW-COST CUTTER FOR  
JOB-SHOPS AND PLANTS WITH  
DIVERSIFIED, SMALL-RUN JOBS**

No longer is Carboloy milling confined to large, quantity-production jobs. This new, general-purpose cutter (standard 5-inch diameter with 12 Carboloy blades) can be used universally on all types of cast iron, non-ferrous metals and non-metallic materials just the same as your ordinary tool-crib cutter. Low cost of this standard cutter assures rapid return on investment while benefiting from the many advantageous features of Carboloy milling. Special re-grinding service available at nominal cost.

Base your decision on the facts! Ask for a demonstration or further information. Just send the coupon below. No obligation.

**CARBOLOY COMPANY, INC.**

Detroit, Michigan

CHICAGO

CLEVELAND

NEWARK

PITTSBURGH

PHILADELPHIA

Carboloy Co., Inc., 2485 E. Grand Blvd., Detroit, Mich.

Without obligation, kindly ☐ Demonstrate ☐ Supply further details on:

☐ Carboloy cutters for production work

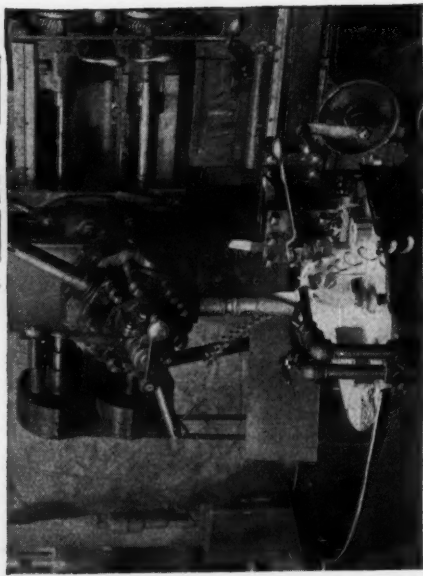
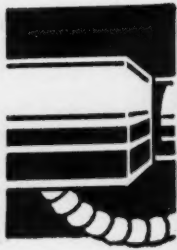
☐ Carboloy standard \$85.00 cutter for diversified work

NAME.....TITLE.....

COMPANY.....

CITY.....STATE.....

# DRILL MORE HOLES PER GRIND



**MACHINE:** Bullard Vertical Turret

Lathe.

**MATERIAL:** 3135 Steel.

**DRILL:** 2 1/4 in., 70 R.P.M.

**LUBRICANT:** T-1 Part Sunoco to 20

cottone oil.

Courtesy of The Bullard Co.,

Bridgport, Conn.

*with Sunoco!*

THE drilling of metals is so often regarded as such a simple operation that it may be overlooked as an important factor in costs. Actual performance records of Sunoco Emulsifying Cutting Oil prove that it definitely helps give greater production, greater accuracy and lower





**T**HE fact that we are not only willing, but eager to have Delta Files tested in competition with other makes of files, surely must reflect our confidence in the superiority of DELTA products.

**ONE MINUTE** . . . sixty seconds of your time is all that is required to make a file test . . . and the verdict rests in your hands. . . . **YOU** will understand why DELTA FILES will save you time and money in all your plant filing operations.

**THE TEST** . . . it's easy and simple to make!

Select two workmen of equal ability. Give each an equal bar of metal, clamped in upright position in a vise. Catch the filings from each. Let the race run sixty seconds (approximately 55 strokes)—better still, let the test run all day. For the longer the test the more pronounced will be the superiority of Delta Files.

**NOW!** Compare the filings. You will find the Delta filings are long chips, like those from a sharp lathe tool, instead of fine dust . . . **AND** . . . when you weigh the filings you will find that the Delta File has removed considerably more metal.

**YOUR** decision will be to save money by standardizing on DELTA FILES.



DELTA FILINGS



OTHER FILINGS

Order a dozen files from the nearest Delta Distributor. If the test does not come out as predicted return them for full credit.



**DELTA FILE WORKS**



4837 James Street (Bridesburg) Philadelphia, Pa., U. S. A.



# FOR TOOL ROOM GRINDING

## *You'll Like the Norton "B"*

**W**ITH tool room men everywhere the Norton "B" bond "white wheel" is increasingly popular. They like its fast, free cutting action, no burn . . . even on the hardest die steels and alloys. They like its fine grain and size . . . the few dressings that are necessary.

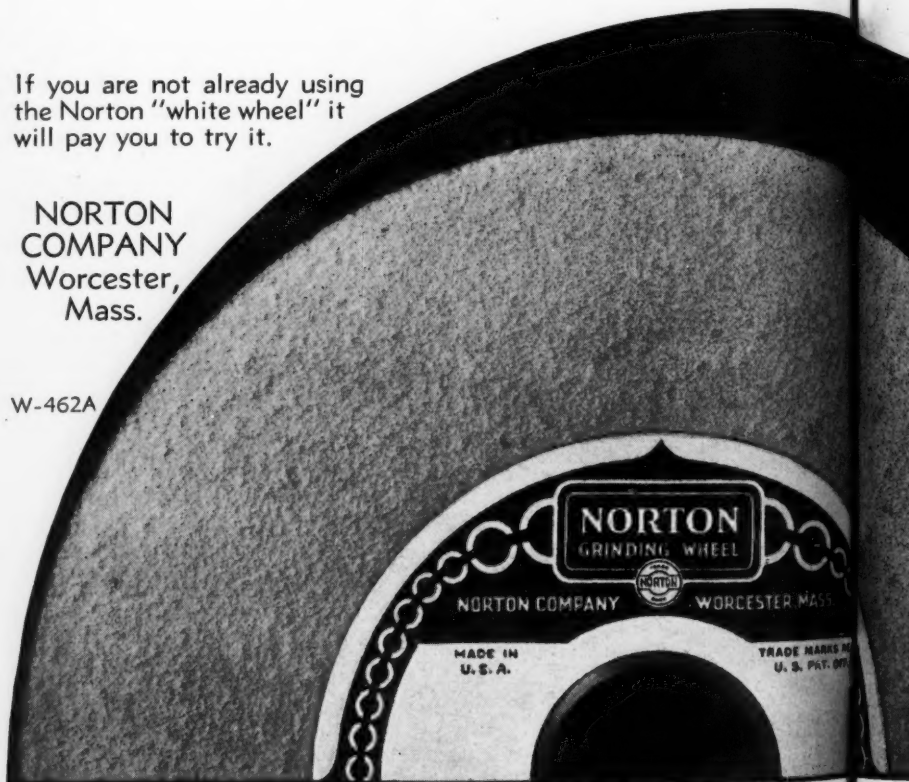
There are three mighty good reasons for the success of the Norton "white wheel": are combined three important Norton features:

1. 38 Alundum abrasive — hard, sharp and free cutting
2. "B" bond — a much improved type of vitrified bond.
3. Controlled Structure — positive regulation of grain to give grinding action for each job.

If you are not already using the Norton "white wheel" it will pay you to try it.

**NORTON  
COMPANY**  
Worcester,  
Mass.

W-462A



# NDING JOBS

## orton" Bond Wheel

ond "wheel" is becoming  
ng acth no tendency to  
y like y it holds its shape

he Newwhite wheel." In it

utting  
bond.  
graining to give the best



### HAVE YOU ANY WORN OR SLIPPERY STAIRWAYS?

Repairs are easy with the Alundum Rubber Bonded Safety Tread. It is permanently non-slip and extremely wear-resisting. Write for information.



# *Specify* "UNION DRAWN" *for High Quality* *Steels*



UNION Cold Drawn Steels can be depended upon, not only for accuracy to size and straightness, bright surface, correct analysis, good machinability and uniformity, but particularly for those intangible qualities which bear such an important influence on your production.

These bars are made with a thorough knowledge of the reactions of steels to various metal working operations. The underlying purpose is to assist your efforts toward the highest efficiency and the best ultimate results. Long experience in fully meeting these needs assures your satisfaction as strongly as the more definite features of the steels.

Union Drawn Distributors in all sections carry large stocks and are prepared to serve the majority of your wants on instant notice.

**COLD DRAWING PROVIDES MAXIMUM MACHINABILITY**

# UNION COLD DRAWN STEELS



May,



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## INDUSTRIAL DIAMONDS



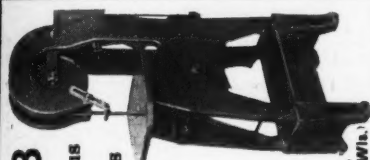
For Trueing Wheels, Wire Drawing, etc.  
Manufacturers of Diamond Tools

Ask for Booklet  
"DIAMONDS FOR INDUSTRIAL  
PURPOSES"

**ANTON SMIT & CO.**

24 State St.

New York



**GROB**

Continuous  
Filing  
Machines

Revolu-  
tionary  
Results

Write for  
full  
Information

**GROB BROS.**  
West Alle, Wis.



Feature:

UNUSUALLY COMFORTABLE ROOMS. THE  
FINEST OF FOODS AND RATES STARTING  
AT \$2.50 SINGLE, \$4.00 DOUBLE.

*In Cleveland it's*

### • The HOLLENDEN

1050 ROOMS, ALL WITH BATH  
RADIO IN EVERY ROOM

*In Columbus it's*

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650 ROOMS, ALL WITH BATH

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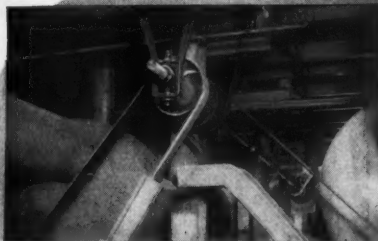
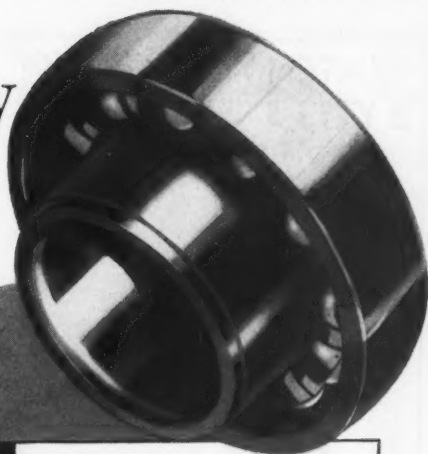
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# One sure way to lower OVERHEAD!



## Results of two power consumption tests at Columbus, Ga.

131 Fafnir Ball Bearing Hanger Boxes installed after the March test and before the December test.

	Reading in KW Mar. 1932	Reading in KW Dec. 1932
20 HP, AC, Wood Shop Motor	6.40	3.30
30 HP, AC, Pattern Shop Motor	8.00	4.30
7½ HP, AC, Core Shop Motor	3.36	1.00
15 HP, AC, Casting Shop Motor	5.20	2.40
50 HP, DC, Casting Shop Motor	8.25	3.66
50 HP, DC, Machine Shop Motor	16.45	13.73
25 HP, DC, Pattern Shop Elevator	3.68	1.95

TOTAL . . . 61.14 KW 29.13 KW

Many manufacturers, confronted with the problem of lower overhead, have found substantial savings in power transmission. They have found numerous plain bearings wasting power, eating up potential profits. They banished this waste and turned a loss into profit.

Glance at the comparison of a typical before-and-after shown on this page. The total horsepower involved is relatively small, but the percentage of saving is appreciable. 22.21 K. W. saved, or better than 76% of the actual power requirements, when Fafnir Ball Bearing Lineshaft Boxes had

banished the waste. Multiply in proportion to your horsepower requirements and you can gain a picture of potential profits—easily obtainable.

Savings did not cease with these power economies. Semi-annual greasings replaced weekly oilings. Lubricant was saved and maintenance expenses were greatly reduced.

If you transmit power it will pay you to investigate the possibilities of Fafnir Ball Bearings and Fafnir Transmission Equipment. We will gladly cooperate and you can be sure of getting immediate service. There's a distributor near by who carries these units in stock. **THE FAFNIR BEARING COMPANY, New Britain, Conn.** Atlanta . . Chicago . . Cleveland . . Dallas . . Detroit . . Philadelphia . . Milwaukee . . Minneapolis . . New York . .

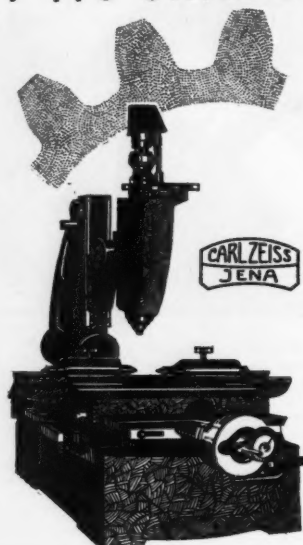


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FACTS such as these in all types of applications are given in "The Dragon". If you're not receiving a copy regularly, please let us know.

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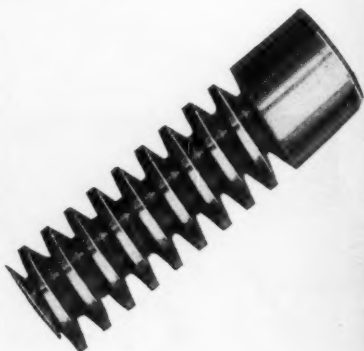
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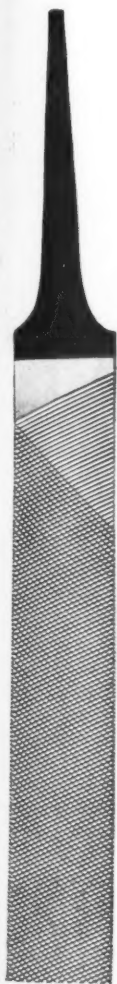
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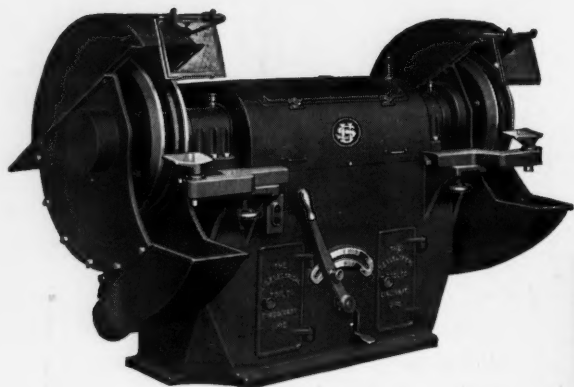
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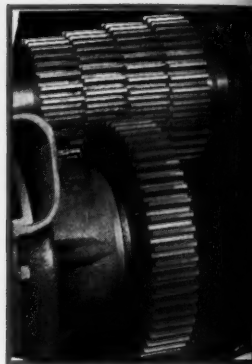
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Certain defects were observed in this volume when it was received by University Microfilms, Inc. Since we were unable to locate a perfect copy, this volume was filmed as received.

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